



Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011 (262)
September 1984



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IAA (A-10000 Series)	A84-33163 - A84-36462
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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 262)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in August 1984 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



Scientific and Technical Information Branch
National Aeronautics and Space Administration
Washington, DC

1984

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 169 reports, articles and other documents announced during August 1984 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1984 Supplements.

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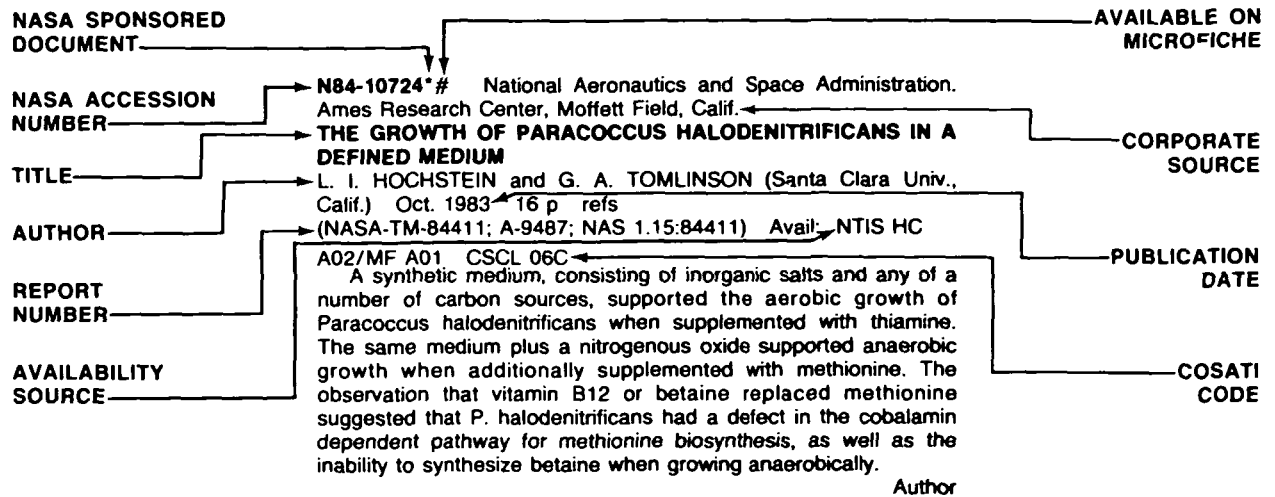
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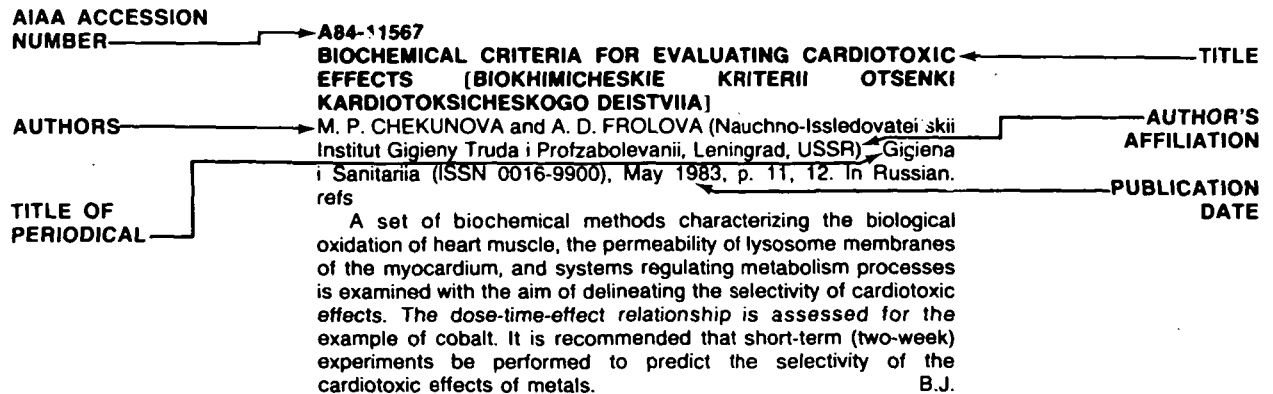
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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 262)

SEPTEMBER 1984

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LIFE SCIENCES (GENERAL)

Includes genetics.

A84-33195

CHEMISTRY OF MOTION: MOLECULAR FOUNDATIONS OF MUSCLE ACTIVITY [KHIMIYA DVIZHENIYA: MOLEKULIARNYE OSNOVY MYSHECHNOI DEIATEL'NOSTI]

N. N. IAKOVLEV Leningrad, Izdatel'stvo Nauka, 1983, 192 p. In Russian. refs

The submicroscopic and molecular structure of muscles, and the molecular mechanisms, biophysics, and energetics of muscular contraction and activity are studied. Different muscles from animals and man are analyzed to investigate the function dependence of muscle structure and energy characteristics. Also studied are the molecular foundations of strength, rate of contraction, endurance, causes of fatigue, and means of increasing physical work capacity. Attention is given to the effects of limited mobility and exercise on the organism, and the relationship between muscle activity and premature aging. J.N.

A84-33950

THE DISINHIBITING EFFECT OF ETHANOL ON THE ACTIVITY OF THE CEREBELLAR PURKINJE CELLS OF THE CAT [RASTORMAZHIVAIUSHCHEE DEISTVIE ETANOLA NA AKTIVNOST' KLETOK PURKIN'E MOZZHECHKA KOSHEK]

R. A. GRIGORIAN and T. M. ISMAILOV (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 275, no. 1, 1984, p. 227-230. In Russian. refs

A84-34002

THE VISUAL FIELD REPRESENTATION IN STRIATE CORTEX OF THE MACAQUE MONKEY - ASYMMETRIES, ANISOTROPIES, AND INDIVIDUAL VARIABILITY

D. C. VAN ESSEN, W. T. NEWSOME, and J. H. R. MAUNSELL (California Institute of Technology, Pasadena, CA) Vision Research (ISSN 0042-6989), vol. 24, no. 5, 1984, p. 429-448. Research supported by the Alfred P. Sloan Foundation. refs (Contract NIH-R01-EY-02091)

A84-34092

BLOOD-BRAIN BARRIER UNDER THE EFFECT OF IONIZING RADIATION IN NORMAL AND ALTERED GASEOUS ATMOSPHERES [GEMATOENTSEFALICHESKII BAR'ER PRI VOZDEISTVII IONIZIRUIUSHCHEGO IZLUCHEENIYA V USLOVIAKH NORMAL'NOI I IZMENENNOI GAZOVOI SREDY]

V. V. ANTIPOV, B. I. DAVYDOV, and I. B. USHAKOV Kosmicheskie Issledovaniia (ISSN 0023-4206), vol. 22, Mar.-Apr. 1984, p. 297-305. In Russian. refs

An analysis is made of recent published data pertaining to changes of the blood-brain barrier (BBB) under the effect of ionizing radiation (with particular emphasis on space-flight conditions). Consideration is given to head and torso irradiation of experimental animals, and the modifying effect of hypoxic hypoxia and hyperoxia on BBB radiation effects is investigated. It is shown that the BBB

permeability tends to decrease as the O₂ content in the gaseous atmosphere increases from 8 to 100 percent. Hypoxic hypoxia and hyperoxia lead to a decrease in the BBB permeability in irradiated animals. B.J.

A84-34143

CAMP-DEPENDENT PROTEIN KINASE ACTIVITY AND PHOSPHORYLATION OF HEART PHOSPHOLAMBAN DURING CIRCULATORY HYPOXIA - THE EFFECT OF TRYPSIN ON THE PHOSPHORYLATION CAPABILITY OF THE PHOSPHOLAMBAN [TSAMF-ZAVISIMAIA PROTEINKINAZNAIA AKTIVNOST' I FOSFORILIROVANIIE FOSFOLAMBANA SERD TSA PRI TSIRKULIATORNOI GIPOKSII - VLIANIE TRIPSINA NA SPOSOBNOST' K FOSFORILIROVANIUIU]

A. E. ANTIPENKO (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) and S. N. LYZLOVA Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 275, no. 2, 1984, p. 490-493. In Russian. refs

A84-34145

A PRONOUNCED INCREASE OF SLOW-WAVE SLEEP IN HOMIOOTHERMS DUE TO ENDOGENOUS SUBSTANCES FROM HIBERNATOR TISSUES [EFFEKT VYRAZHENNOGO UVELICHENIYA MEDLENNOVOLNOVOGO SNA U TEPILOKROVNYKH ENDOGENNYMI VESHCHESTVAMI IZ TKANEI ZIMOSPIASHCHIKH]

IU. F. PASTUKHOV and I. E. CHEPKASOV (Akademiia Nauk SSSR, Institut Biologicheskikh Problem Severa, Magadan, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 275, no. 2, 1984, p. 510-512. In Russian. refs

A84-34165

REAL-TIME OPTICAL IMAGING OF NATURALLY EVOKED ELECTRICAL ACTIVITY IN INTACT FROG BRAIN

A. GRINVALD, L. ANGLISTER, R. HILDESHEIM, A. MANKER (Weizmann Institute of Science, Rehovot, Israel), and J. A. FREEMAN (Vanderbilt University, Nashville, TN) Nature (ISSN 0028-0836), vol. 308, April 26, 1984, p. 848-850. Research supported by the US-Israel Binational Science Foundation, and March of Dimes. refs (Contract PHS-NS-14716; PHS-EY-0117)

Voltage-sensitive dyes and photodiode arrays are used to investigate the intact optic tectum of the frog. It is shown that optical measurement can be used for real-time imaging of spatiotemporal patterns of neuronal responses and for identification of functional units evoked by natural visual stimuli. The structure of the new voltage-sensitive probe that facilitates the in vivo application of this technique is also reported. C.D.

A84-34391

CHARACTERISTICS OF MICROWAVE POWER ABSORPTION IN AN INSECT EXPOSED TO STANDING-WAVE FIELDS

O. FUJIWARA, Y. GOTO, and Y. AMEMIYA (Nagoya University, Nagoya, Japan) Electronics and Communications in Japan (ISSN 0424-8368), vol. 66, Sept. 1983, p. 46-54. Translation. refs

The characteristics of absorbed power in an insect exposed to microwave standing-wave electromagnetic fields in free space are analyzed. In the case of the *Tenebrio* pupa, the frequency dependence of both absorbed power and heating potential is clarified in relation to the exposure locations. It is found that at a

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frequency of 2.45 GHz, a pupa can be exposed to approximately uniform electric and magnetic components of the fields. It is noted that at Olsen's (1978) frequency, 5.95 GHz, this is not the case, and the distribution of heating potential differs markedly between the two frequency bands. C.R.

A84-34476

RECOVERY OF CELL IMMUNITY SYSTEMS AFTER SUBLETHAL IRRADIATION [VOSTANOVLENIE KLETOCHNYKH SISTEM IMMUNITETA POSLE SUBLETAL'NOGO OBLUCHENIIA]

E. N. KIRILLOVA (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 195-198. In Russian. refs

A84-34477

INVESTIGATION OF CHROMATIN DEGRADATION IN RAT PERIPHERAL-BLOOD LEUKOCYTES DURING THE FIRST THREE DAYS AFTER COMBINED RADIATION AND BURN [ISSLEDOVANIE RASPADA KHROMATINA LEIKOTSITOV PERIFERICHESKOI KROVI KRYV V PERYVE TROE SUTOK POSLE KOMBINIROVANNOGO RADIATIONNOGO PORAZHENiIA]

N. A. PECHENINA, N. I. RIABCHENKO, and A. I. BRITUN (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 210-213. In Russian. refs

A84-34478

RADIATION EFFECTS IN PLASMA MEMBRANES ACCORDING TO INFRARED SPECTROSCOPIC DATA [RADIATIONNYE EFFEKTY V PLAZMATICHESSKIKH MEMBRANAKH PO DANNYM IK-SPEKTROSKOPII]

V. P. VERBOLOVICH, S. T. RYSKULOVA, and E. V. POLETAEV (Ministerstvo Zdravookhraneniia Kazakhskoi SSR, Nauchno-Issledovatel'skii Institut Klinicheskoi i Eksperimental'noi Khirurgii; Akademiia Nauk Kazakhskoi SSR, Institut Zoologii, Alma-Ata, Kazakh SSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 227-230. In Russian. refs

An infrared spectroscopic analysis of plasma membranes in the livers of rats and guinea pigs was made, following exposure to X-ray doses of 7.65 Gy. Readings were taken 1, 24, and 72 hours, and 7 days following irradiation. Changes were observed in the mobility of polypeptide chains, and in the formation of proteins. Hydrophobic interactions of phospholipid acid residues were found to increase, and lipid oxidation was inhibited. I.H.

A84-34479

LEVEL OF DEHYDROGENASE ACTIVITY IN CHIPMUNKS UNDER NORMAL CONDITIONS AND UNDER THE CHRONIC EFFECT OF EXTERNAL GAMMA-IRRADIATION [UROVEN' AKTIVNOSTI DEGIDROGENAZ V NORME I PRI KHRONICHESKOM DEISTVII VNESHNEGO GAMMA-OBLUCHENIIA U BURUNDUKOV]

A. G. KUDIASHEVA and A. I. TASKAEV (Akademiia Nauk SSSR, Institut Biologii, Syktyvkar, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 230-233. In Russian. refs

A84-34480

INVESTIGATION OF THE PATHS OF THE FORMATION OF THE RADIOMODIFYING EFFECT OF SEROTONIN ON HEMOPOIETIC CELLS [ISSLEDOVANIE PUTEI REALIZATSII RADIOMODIFITSIRUIUSHCHEGO DEISTVIA SEROTONINA NA KLETKI KROVETVORNOI SISTEMY]

I. B. SMIRNOVA, G. V. DONTSOVA, M. M. KONSTANTINOVA, and O. N. RAKHMANINA (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 236-240. In Russian. refs

The modifying effect of serotonin on radiation-induced blood cell damage in mice is studied. Mice were injected with serotonin (0.5 and 2.0 mg per mouse) 5 minutes before and immediately after irradiation corresponding to dose levels of 4.5 and 7.0 Gy. Follow-up examinations of cell tissue in the spleen and bone

marrow were made 3 to 20 days after irradiation. In mice injected with serotonin before irradiation, it was observed that a greater number of CFUs survived; cells in the bone marrow were restored, and spleen weight increased. In mice injected with serotonin after irradiation, the restoration of cells in bone marrow was observed. I.H.

A84-34481

THE EFFECT OF ELEVATED NATURAL RADIOACTIVITY ON THE BONE MARROW MORPHOLOGY OF MICROTUS OECONOMUS PALL [VLIANIE POVYSHENNOI ESTESTVENNOI RADIOAKTIVNOSTI V SREDE OBITANIIA NA MORFOLOGIIU KOSTNOGO MOZGA U MICROTUS OECONOMUS PALL]

L. D. MATERII and K. I. MASLOVA (Akademiia Nauk SSSR, Institut Biologii, Syktyvkar, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 243-246. In Russian. refs

Distinctive aspects of the bone marrow morphology of the rodent *Microtus oeconomus* Pall are studied with respect to a level of natural alpha, beta, and gamma background radiation which is higher than normal. *Microtus oeconomus* Pall is found to exhibit focal myeloid and erythroid elements, and an increased number of caryocytes due to increased mitotic activity. It is suggested that the action of *Microtus oeconomus* Pall's hemopoiesis is an evolutionary adaptation to the higher level of background radiation in the animal's environment. I.H.

A84-34482

AGE-RELATED CHANGES IN RADIOSENSITIVITY OF ANIMALS AND CRITICAL CELL SYSTEMS - SURVIVAL RATE OF STEM CELLS IN THE SMALL-INTESTINE EPITHELIUM AND MORTALITY RATE OF MICE OF VARIOUS AGES FOUR TO FIVE DAYS AFTER IRRADIATION [VOZRASNYYE IZMENENIIA RADIOCHUVSTVITEL'NOSTI ZHIVOTNYKH I KRITICHESKIKH KLETOCHNYKH SISTEM - VYZHIVAEMOST' STVOLOVYKH KLETOK EPITELIIA TONKOGO KISHECHNIKA I 4-5-SUTOCHNAIA SMERTNOST' MYSHEI RAZNOGO VOZRASTA POSLE OBLUCHENIIA]

O. A. KONOPLIANNIKOVA and A. G. KONOPLIANNIKOV (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 249-252. In Russian. refs

A84-34483

RADIOPROTECTION EFFECTIVENESS OF THE HYPOXIC GAS MIXTURE GHM-10 IN EXPERIMENTS ON DOGS [RADIOZASHCHITNAIA EFFEKTIVNOST' GAZOVOI GIPOKSICHESKOI SMESI GGS-10 V OPYTAKH NA SOBAKAKH]

R. B. STRELKOV, A. IA. CHIZHOV, N. G. KUCHERENKO, L. P. ZHAVORONKOV, I. E. SKLOBOVSKAIA, V. A. TSYGANKOVA, V. P. LEPEKHIN, and M. IA. RONIN (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 264-266. In Russian.

One-hundred-twenty-eight dogs weighing between 7-24 kg inhaled an hypoxic gas mixture GHM-10 percent O₂ and 90 percent P₂, following exposure to cobalt-60 gamma radiation at doses of 2.8, 3.5, 4.2, and 8.0 Gy. It was found that inhalation of PO₂ reduced radiation concentrations in hypodermic tissue, bone marrow, and in the lower intestine. At the dose of 8.0 Gy, the average life span of the animals increased from 6.2 (+ or 0.8 days) to 9.3 (+ or - 1.1 days) after the inhalation of GHM-10. I.H.

A84-34484

PARAMETRIC ANALYSIS OF TIME-OF-DEATH STATISTICS FOR IRRADIATED ANIMALS [K PARAMETRICHESKOMU ANALIZU SROKOV GIBELI OBLUCHENNYKH ZHIVOTNYKH]

N. O. KADYROVA and L. V. PAVLOVA (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Institut, Leningrad, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 267-269. In Russian. refs

A84-34485

THE EFFECT OF DECIMETER-WAVE ELECTROMAGNETIC RADIATION ON MYOCARDIUM CELL MEMBRANES [DEISTVIE ELEKTROMAGNITNOGO IZLUCHENIIA DETSIMETROVOGO DIAPAZONA NA KLETOCHNYE MEMBRANY MIOKARDA]

S. M. ZUBKOVA and I. B. LAPRUN (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR) Radiobiologiya (ISSN 0033-8192), vol. 24, Mar.-Apr. 1984, p. 276-279. In Russian. refs

The effect of electromagnetic waves (0.5 GHz) on the chemical processes of myocardium cell membranes is studied. It was found that the rate of lipid peroxidation in the sample membrane tissue was decreased by as much as 8 percent after exposure to decimeter waves. Chlortetracycline and free calcium ions adsorbed to the membrane surfaces, and the fluorescence of the chlortetracycline was found to be increased. Membranes treated with p-chlormercuribenzoate exhibited opposite effects, as the rate of lipid peroxidation increased by 3.9 times as a result of radiation. The effect of the decimeter waves is believed to have compensated for changes in cell structure induced by p-chlormercuribenzoate.

I.H.

A84-34595

SENSORY SYSTEMS [SENSORNYE SISTEMY]

A. S. BATUEV, ED. Leningrad, Izdatel'stvo Nauka, 1983, 192 p. In Russian.

This collection of survey articles and investigative works is devoted to the problem of sensory system interactions on the receptor level, neurophysiological mechanisms of sensory system interaction in the formation of thalamo-cortical associative projections, and the role of various sensory factors in behavioral organization. Other topics are neurophysiological and neurochemical mechanisms of reflexive analgesia, and the effect of extreme stimulation on visual afferent systems. Principal features of the correction of hearing loss through electrode implantation are also considered.

J.N.

A84-34596

EVALUATION OF SPATIAL SIGNAL CHARACTERISTICS BY ASSOCIATIVE FIELDS OF THE NEOCORTEX [OTSENKA PROSTRANSTVENNYKH PRIZNAKOV SIGNALA ASSOTSIIATIVNYMI POLIAMMI NEOKORTEKSA]

V. I. SHEFER and A. A. ORLOV (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) IN: Sensory systems. Leningrad, Izdatel'stvo Nauka, 1983, p. 58-69. In Russian. refs

Task completion during testing for delayed spatial selection with Macaca nemestrina monkeys was used to investigate the functional properties of neurons in the prefrontal (middle section of the s. principalis) and the parietal (field 7) cortices of both hemispheres. Impulse activity during production of the conditional signal was seen to be location-dependent in ten of the investigated neurons of the parietal cortex. The participation of this region along with the parietal cortex is indicated in the maintenance of short-term spatial memory. Also, the activity of some neurons was related to the direction of the monkey's response to right-side or left-side visual stimuli while the activity of others depended only on the localization of the conditional signal.

J.N.

A84-34597

INTERACTION OF THERMAL AND NONTHERMAL RECEPTIVE SIGNALIZATION IN THE MECHANISM FOR THE FORMATION OF THERMOREGULATION OF MOTONEURAL POOL ACTIVITY [VZAIMODEISTVIE TERMICHESKOI I NETERMICHESKOI RETSEPTIVNOI SIGNALIZATSII V MEKHANIZME FORMIROVANIYA TERMOREGULIATSIONNOI AKTIVNOSTI MOTONEIRONNOGO PULA]

IU. V. LUPANDIN (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR) IN: Sensory systems. Leningrad, Izdatel'stvo Nauka, 1983, p. 95-110. In Russian. refs

An experimental approach to the study of the elementary intraspinal program for a determination of motoneural pool activity is proposed. This model provides an important relationship between the postural activity of the motoneural pool and the thermoreceptive

sensory background. The present approach is based on an investigation of the impulse activity of 205 motor units of cat sartorius muscle during general cooling and anesthesia. The distribution of thermoregulation activity in antagonist muscles in the extremities of both anesthetized and unanesthetized cats shows that during cold shivering, muscles participating in general flexion reactions are activated along with neck and torso muscles while the flexor muscles remain inactive. The influence of nociceptive signalling, proprioceptive signalling, vestibular signalling, and picrotoxin on thermoregulation is also studied.

J.N.

A84-34598

NEUROPHYSIOLOGICAL AND NEUROCHEMICAL MECHANISMS OF REFLEXIVE ANALGESIA [NEIROFIZIOLOGICHESKIE I MEIKROKHIMICHESKIE MEKHANIZMY REFLEKTORNOI ANAL'GEZII]

R. A. DURINIAN, V. K. RESHETNIAK, and E. O. BRAGIN (Tsentral'nyi Nauchno-Issledovatel'skii Institut Refleksoterapii, Moscow, USSR) IN: Sensory systems. Leningrad, Izdatel'stvo Nauka, 1983, p. 110-120. In Russian. refs

The method of induced potentials (IP) was used to objectively evaluate sensory system reactions in the brains of anesthetized cats for nociceptive signals in the development of analgesia. It was established that the auricular electroacupuncture (EAP) effect (lasting 15-30 min) significantly influences the behavior of nociceptive signals during stimulation of the dental pulp. Also investigated was the influence of EAP on IP in the posterior ventromedial core and parafascicular complex of the thalamus during nociceptive stimulation. The introduction of naloxone led to a restoration of the IP amplitude after it had been depressed following EAP. Experiments determining the levels of endogenous opiates in the central gray matter, medial thalamus, and hypothalamus indicate the decreased concentrations of these substances during the production of reflexive analgesia. It is concluded that the somatosensory regions of the cerebral cortex, especially CII, having close functional ties with antinociceptive structures, regulate the activity of these structures during EAP.

J.N.

A84-34599

FUNCTIONING AND INTERACTION OF VISUAL AFFERENT SYSTEMS IN CONDITIONS OF EXTREME STIMULATION [FUNKTSIONIROVANIIE I VZAIMODEISTVIE ZRITEL'NYKH AFFERENTNYKH SISTEM V USLOVIIAKH IKH EKSTREMAL'NOGO RAZDRAZHENIIA]

A. S. MOZZHKHIN and V. I. SHOSTAK (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) IN: Sensory systems. Leningrad, Izdatel'stvo Nauka, 1983, p. 120-133. In Russian. refs

The dynamics of photosensitivity recovery of the center and periphery of the retina was studied in experiments involving illumination of sections of the retina by light pulses 0.08-2.1 ms in duration with maximum intensity of 40 gigacandelas/sq m. The results indicate that the mutually inhibiting influences of the photopic and scotopic afferent systems may appear as a functional weakening of each depending on the adapting luminance conditions. An evaluation of differential thresholds using Landolt rings indicates that variations in contrast sensitivity have various origins. Intense light pulses caused the least loss of adaptability in the red color receptor system. Decreased sharpness of vision is attributed to the development of an intense after-image. The influence of light flashes on the amount of rhodopsin and on the bioelectrical activity of the retina is also considered.

J.N.

A84-34703

INTERACTING EFFECTS OF HYPOXIA ADAPTATION AND ACUTE HYPERCAPNIA ON OXYGEN TOLERANCE IN RATS

J. M. CLARK (Pennsylvania University, Philadelphia, PA). Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, May 1984, p. 1191-1198. refs

(Contract NIH-HL-22259; NIH-HL-08899; N00014-76-C-0248)

A84-34707**LEUKOTRIENE SYNTHESIS AND RECEPTOR BLOCKERS BLOCK HYPOXIC PULMONARY VASOCONSTRICTION**

M. L. MORGANROTH, J. T. REEVES, R. C. MURPHY, and N. F. VOELKEL (Colorado, University, Denver, CO) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1340-1346. refs
(Contract NIH-HL-07085; NIH-HL-01047)

Isolated blood perfused rat lungs were exposed to divers structurally unrelated inhibitors of leukotriene synthesis and/or action (diethylcarbamazine citrate (DEC), U-60257, and FPL 55712) to determine if the inhibitors were able to block hypoxic vasoconstriction without producing a nonspecific decrease in vascular reactivity. DEC blocked ongoing and subsequent hypoxic pressor responses, though it hardly influenced the angiotensin II pressor response. U-60257 blocked the hypoxic pressor response but did not affect the pressor response to angiotensin II or potassium chloride, and FPL 55712 inhibited the pressor response to hypoxia but not to angiotensin II. It was concluded that leukotriene inhibitors preferentially blocked hypoxic vasoconstriction, by causing vasoconstriction themselves or by acting as modulators to increase vascular reactivity. C.M.

A84-34708**VENTILATORY RESPONSE TO HYPERCAPNIA DURING SLEEP AND WAKEFULNESS IN CATS**

A. NETICK, W. J. DUGGER, and R. A. SYMMONS (California State University, Hayward, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1347-1354. refs
(Contract NSF BNS-79-05511)

The hypercapnic response during the sleep-waking cycle in cats was examined. It was found that the length of the respiratory cycle was augmented during nonrapid-eye-movement (NREM) sleep and was diminished during rapid-eye-movement (REM) sleep; the inspiratory fraction of the cycle increased from wakefulness (W) to NREM to REM; tidal volume decreased during REM as compared to W of NREM; and alveolar ventilation was greater during W than during NREM. Eye movements which quantified phasic REM were only slightly negatively correlated with the deviation of ventilation from the response curve, and the hypercapnic response was decreased during REM. It was concluded, based on a comparison between the hypercapnic responses of dogs and cats, that interspecies differences might account for earlier contradictory results. C.M.

A84-34712**MEASUREMENT OF HORMONES AND BLOOD GASES DURING HYPOXIA IN CONSCIOUS CANNULATED RATS**

H. RAFF and K. D. FAGIN (California, University, San Francisco, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1426-1430. refs
(Contract NIH-AM-28172; NIH-AM-06419; NIH-AM-07265)

Simple inexpensive methods are described for implanting chronic arterial cannulas for remote stress-free blood sampling of conscious unrestrained rats and for delivering acute isocapnic hypoxia to these rats in their home cages. The day before experimentation cages were placed in plastic bags with air (21 percent O₂) flowing through at 15 l/min (normoxia). The next morning either normoxia was continued or isocapnic hypoxia (arterial PO₂ 38 Torr, arterial PCO₂ 38 Torr) was administered without handling or disturbing the rats. Repeated arterial samples were collected for measurement of blood gases, hematocrit, corticosterone, and ACTH. Blood pressure increased transiently (by 10 mmHg at 10 min) and plasma corticosterone and ACTH levels increased fivefold; hematocrit and heart rate did not change significantly. In rats receiving normoxia, all of these variables remained low. This preparation is useful for studying in conscious rats the regulation of endocrine systems easily stimulated by handling and for studying endocrine and cardiovascular adaptations to environmental stimuli such as hypoxia. Author

A84-34800**SPECTRAL SENSITIVITY OF SINGLE CONES IN THE RETINA OF MACACA FASCICULARIS**

B. J. NUNN, J. L. SCHNAPF, and D. A. BAYLOR (Stanford University, Stanford, CA) *Nature* (ISSN 0028-0836), vol. 309, May 17, 1984, p. 264-266. refs
(Contract PHS-EY-01543)

The spectral absorption of two types of retinal cone is analyzed by recording electrical responses to monochromatic light. The observations were made on the retinal cones of the monkey *Macaca fascicularis*, which is thought to have retinal cone pigments similar to those of man. The measured spectral sensitivities of the red-sensitive (red) and green-sensitive (green) cones agreed well with estimates of the cone pigment absorptions derived from color matching experiments in humans. At long wavelengths the sensitivity of the red cones was found to decline more rapidly than that of the green. This behavior explains the hue shift in which a light of long wavelength is perceived to be identical to a light of shorter wavelength. I.H.

A84-35596**EVOLUTION OF CATALYTIC PROTEINS OR ON THE ORIGIN OF ENZYME SPECIES BY MEANS OF NATURAL SELECTION**

H. KACSER and R. BEEBY (Edinburgh, University, Edinburgh, Scotland) *Journal of Molecular Evolution* (ISSN 0022-2844), vol. 20, no. 1, 1984, p. 38-51. refs

The origin of numerous diverse enzymes found in contemporary cells is considered. It is argued that natural selection is an agent of change that can be used predictively in analyzing the evolution of the earliest enzyme systems. The period between 4000 and 3500 million years ago is examined, and the function and the kinetics of growth are stressed. It is maintained that the enzyme systems in early cells were composed of a few catalytic proteins with low specificity and low turnover number. It is shown that selection for growth rate favors duplication and divergence and produces a proliferation of enzyme species. Survival of the fastest effects a large quantity of functionally differentiated catalysts, a characteristic of all present-day organisms. C.M.

A84-35598**DIFFERENTIAL COUPLING EFFICIENCY OF CHEMICALLY ACTIVATED AMINO ACID TO tRNA**

M. KINJO, M. ISHIGAMI, T. HASEGAWA, and K. NAGANO (Jichi Medical School, Minamikawachi, Tochigi, Japan) *Journal of Molecular Evolution* (ISSN 0022-2844), vol. 20, no. 1, 1984, p. 59-65. refs

Interaction based on possible chemical affinity of an amino acid for tRNA was examined as a model for the aminoacylation of primitive tRNA without aid of an enzyme system. Two types of reaction were carried out and compared. One was the acyl linkage of amino acid to the 5'-terminal phosphate of a tRNA activated as an imidazolide. The other was the incorporation of an amino acid activated as an imidazolide into 2'(3')-hydroxyl groups of intact tRNA. Both types of reaction indicated that none of the amino acids tested had any selectivity for the tRNAs examined. However, the rates of reaction with a given tRNA were different among amino acids. In the second type of reaction, amino acids were found mainly at loop-out regions of tRNA, but not at either 5'- or 3'-terminal sites. Author

A84-35599* Alabama Univ., Birmingham.

BINDING CONSTANTS OF PHENYLALANINE FOR THE FOUR MONONUCLEOTIDES

M. A. KHALED, D. W. MULLINS, JR., and J. C. LACEY, JR. (Alabama, University, Medical Center, Birmingham, AL) *Journal of Molecular Evolution* (ISSN 0022-2844), vol. 20, no. 1, 1984, p. 66-70. refs
(Contract NGR-01-010-001)

Earlier work has shown that several properties of amino acids correlate directly with properties of their anticodonic nucleotides. Furthermore, in precipitation studies with thermal proteinoids and homopolyribonucleotides, an anticodonic preference was displayed between Lys-rich, Pro-rich and Gly-rich thermal proteinoids and

their anticodon polyribonucleotides. However, Phe-rich thermal proteinoid displayed a preference for its codonic nucleotide, poly U. This inconsistency seemed to be explained by a folding in of the hydrophobic residues of Phe causing the proteinoid to appear more hydrophilic. The present work used nuclear magnetic resonance techniques to resolve a limited question: to which of the four nucleotides does Phe bind most strongly? The results show quite clearly that Phe binds most strongly to its anticodon nucleotide, AMP. Author

A84-35600

EVOLUTION VS THE NUMBER OF GENE COPIES PER PRIMITIVE CELL

A. L. KOCH (Indiana University, Bloomington, IN) *Journal of Molecular Evolution* (ISSN 0022-2844), vol. 20, no. 1, 1984, p. 71-76. refs

(Contract NSF PCM-79-11241)

Computer simulations are presented of the rate at which an advantageous mutant would displace the prototype in a replicating system without an accurate segregation mechanism. If the number of gene copies in the system is indefinitely large, Darwinian evolution is essentially stopped because there is no coupling of phenotype with genotype, i.e., there is no growth advantage to the advantageous gene relative to the prototype and therefore no 'survival of the fittest'. The inhibition of evolution due to a number of gene copies less than 100 would have been not insurmountable. Although the presence of multiple copies would have allowed replacement by an advantageous mutant, it provided a way for the primitive cell to conserve less immediately useful genes that could evolve into different or more effective genes. This possibility was lost as accurate segregation mechanisms evolved and cells with few copies of each gene, such as modern procaryotes, arose. Author

A84-36223

THE BIOCHEMISTRY OF MEMORY - A NEW AND SPECIFIC HYPOTHESIS

G. LYNCH and M. BAUDRY (California, University, Irvine, CA) *Science* (ISSN 0036-8075), vol. 224, June 8, 1984, p. 1057-1063. Research supported by the Du Pont de Nemours and Co. refs (Contract NIH-MH-19793-12; NIH-AG-00538; NSF BNS-76-11370; NSF BNS-81-12156)

Recent studies have uncovered a synaptic process with properties required for an intermediate step in memory storage. Calcium rapidly and irreversibly increases the number of receptors for glutamate (a probable neurotransmitter) in forebrain synaptic membranes by activating a proteinase (calpain) that degrades fodrin, a spectrin-like protein. This process provides a means through which physiological activity could produce long-lasting changes in synaptic chemistry and ultrastructure. Since the process is only poorly represented in the brain stem, it is hypothesized to be responsible for those forms of memory localized in the telencephalon. Author

N84-24674*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Flight Medicine.

FREE-FLYER BIOSTACK EXPERIMENT

H. BUECKER *In NASA. Langley Research Center Long Duration Exposure Facility (LDEF) p 139-145 Feb. 1984*

Avail: NTIS HC A09/MF A01; also available SOD HC CSCI 06C

The free-flyer biostack experiment is part of a radiobiological space research program that includes experiments in space as well as in accelerators on Earth. The program has been specially designed to increase knowledge concerning the importance, effectiveness, and hazards of the structured components of cosmic radiation to man and to any biological specimen in space. Up to now, our understanding of the ways in which HZE particles might affect biological matter is based on a few spaceflight experiments from the last Apollo missions and on the limited data available from heavy-ion irradiation from accelerators. In the near future, accelerators capable of accelerating particles up to higher atomic

numbers and higher energies will promote increased activity in ground-based studies on biological effects of HZE particles. Comparison of data from such irradiation experiments on Earth with those from an actual spaceflight experiment will show any potential influence of the inevitably attendant spaceflight factors (e.g., weightlessness) on the radiobiological events. B.W.

N84-24675*# Park (George W.) Seed Co., Inc., Greenwood, S.C.

SEEDS IN SPACE EXPERIMENT (P0004-1)

G. B. PARK, JR. and J. A. ALSTON *In NASA. Langley Research Center Long Duration Exposure Facility (LDEF) p 146-147 Feb. 1984*

Avail: NTIS HC A09/MF A01; also available SOD HC CSCI 06C

The specific objectives of this experiment are to evaluate the effects of space radiation on the survivability of seed stored in space under sealed and vented conditions and to determine possible resulting mutants and changes in mutation rates. Author

N84-24676*# National Aeronautics and Space Administration, Washington, D. C.

SPACE-EXPOSED EXPERIMENT DEVELOPED FOR STUDENTS

D. K. GRIGSBY *In NASA. Langley Research Center Long Duration Exposure Facility (LDEF) p 148-150 Feb. 1984*

Avail: NTIS HC A09/MF A01; also available SOD HC CSCI 06C

This experiment will offer students the opportunity to evaluate the survivability of seeds stored in the space environment and to determine possible mutants and changes in the mutation rate which may occur. The objectives of this experiment are to involve a very large number of students in a national project to generate interest in science and related disciplines; to offer students from the elementary through the university level an opportunity to participate in a first-hand experiment with materials flown in space; to permit active involvement in classroom experiment design, decision making, data gathering, and comparison of results; and to emphasize a multidisciplinary approach to the project involving subject areas other than science. B.W.

N84-25247# Joint Publications Research Service, Arlington, Va. **USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 18, NO. 2, MARCH - APRIL 1984**

O. G. GAZENKO, ed. 16 May 1984 152 p refs Transl. into ENGLISH of Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 96 p (JPRS-USB-84-004) Avail: NTIS HC A08

This serial report contains news items, abstracts, and articles of scientific reports on aspect of space biology and aerospace medicine including medical studies on Salyut 6; erythrocyte adhesion; hemodynamic parameters during flight; adaptive effects of immersion on man; hypoxia; metabolism; circadian rhythm; and morphological study of primate muscle fibers.

N84-25261# Joint Publications Research Service, Arlington, Va. **EFFICACY OF CONDITIONING ANIMALS TO HYPOXIA DURING SLEEP**

V. B. MALKIN and N. F. LANDUKHOVA *In its USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 94-99 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 67-70*

Avail: NTIS HC A08

In sleeping animals (sleep induced by the drugs aminasine and elenium) step by step training for 13 days (six hours daily) in an altitude chamber produces a number adaptive changes such as hemopoiesis stimulation, slower weight gain, increased adrenal weight and, most important, elevated altitude tolerance. The state of drug induced sleep can be well used to train for altitude hypoxia. M.A.C.

51 LIFE SCIENCES (GENERAL)

N84-25264# Joint Publications Research Service, Arlington, Va.
METHOD OF DETERMINING INTENSITY OF ELIMINATION OF MICROORGANISMS FROM HUMAN UPPER RESPIRATORY TRACT

G. O. POZHARSKIY *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 110-114 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 78-80

Avail: NTIS HC A08

The transmission of airborne bacterial diseases by way of the human respiratory tract is investigated. A device to collect and identify the pathogens is described. Aspiration of exhaled air is effected with an attachment consisting of mask, air duct, in the upper third of which valve is installed, and ring fastener, with which the attachment is connected to the air collecting part of Krotov's apparatus. The subject reads aloud a standard text for 4 min. The Krotov's apparatus is turned on with the start of articulation, and air is collected at the rate of 25 liters per minute. This permits complete aspiration of the entire volume of exhaled air on solid nutrient medium in a Petri dish placed in the apparatus. Three groups were studied, using appropriate standard culture techniques for statistical comparison. M.A.C.

N84-25265# Joint Publications Research Service, Arlington, Va.
OXIDATIVE ENZYME ACTIVITY IN RAT BLOOD PLASMA AND SUBCELLULAR FRACTION OF LIVER FOLLOWING FLIGHT ABOARD COSMOS-936 BIOSATELLITE

R. A. TIGRANYAN and Y. G. VETROVA *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 115-118 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 81-82

Avail: NTIS HC A08

The activity of the key enzymes of oxidative metabolism malate dehydrogenase (MDH) and isocitrate dehydrogenase (ICDH), in rat blood plasma and subcellular liver fractions after completion of flight aboard Cosmos-936 biosatellite was investigated. The Krebs cycle is the general ultimate route of oxidative catabolism of protein, fats and carbohydrates in living organisms. The activity of different reactions of the Krebs cycle as a whole determines the intensity of oxidative processes in tissues. A comparison of MDH and ICDH activity in blood plasma of rats flown aboard the biosatellite and submitted to weightlessness or artificial gravity (AG) failed to demonstrate changes either in parameters of the above mentioned flight group or in comparison to values for vivarium control animals. The parameters of both groups of rats in the synchronous experiments also failed to reveal changes in activity of the tested enzymes, as compared to the vivarium control. M.A.C.

N84-25266# Joint Publications Research Service, Arlington, Va.
EFFECT OF CENTRIFUGING ON SURVIVAL OF EARLY LARVAE OF COMMON FROGS

E. A. OYGENBLIK *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 119-122 16 May 1984 Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 82-84

Avail: NTIS HC A08

There are developmental stages sensitive to hypergravity, but reactions of the developing embryo to prolonged and relatively mild exposure was not previously investigated. The effect of accelerations of two, three, and five G forces on the survival of embryos and early larvae of the common frog (*Rana temporaria*) and the incidence of developmental anomalies is tested. M.A.C.

N84-25267# Joint Publications Research Service, Arlington, Va.
NUCLEIC ACID CONTENT OF CANINE LIVER DURING LONG-TERM EXPERIMENTAL HYPOKINESIA

V. G. PRISENKO *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 123-125 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 85-86

Avail: NTIS HC A08

The quantitative levels of nucleic acids in animal liver cells in the case of prolonged restriction of mobility (from 24 h to 240 days) is investigated. The results of biochemical analysis indicate that long term hypokinesia leads to reduction in quantity of nucleic acids in the liver. The critical period of restricted movement is established at three months, when the nucleic acids have minimum values as compared to normal. Further hypokinesia does not lead to decline in liver cells. M.A.C.

N84-25269# Joint Publications Research Service, Arlington, Va.
MOUSE ADRENAL CORTICOSTERONE CONTENT DURING PROLONGED EXPOSURE TO HIGH-INTENSITY STATIONARY MAGNETIC FIELD

Z. F. KUZMINA *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 130-133 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 87-89

Avail: NTIS HC A08

The functional state of the adrenal cortex according to its corticosterone levels in the course of prolonged and continuous exposure to high intensity stationary magnetic field SMF is evaluated. The reaction of the adrenocortical system to prolonged exposure to a strong magnetic field is characterized by a specific pattern. The initial intensification of function is followed by adaptation to the continuously present magnetic field, with a phase of diminished hormone synthesis. With further exposure to this factor, there is a second activation of adrenocortical function. M.A.C.

N84-25272*# National Biomedical Research Foundation, Washington, D. C.

INVESTIGATION OF COMPOUNDS ESSENTIAL FOR THE ORIGIN OF LIFE Final Report, 1 Sep. 1979 - 31 Dec. 1983

M. O. DAYHOFF and L. T. HUNT 1983 35 p

(Contract NASW-3317)

(NASA-CR-173538; NAS 1.26:173538) Avail: NTIS HC A03/MF A01 CSCL 06C

Nucleic acid sequencing as a technique to determine the chemical and biological evolution of certain prokaryotic metabolic pathways is discussed. Protein in data and a microbiological organization of the prokaryotes is included. M.A.C.

N84-25273# Ohio Wesleyan Univ., Delaware. Dept. of Psychology.

FUNCTIONAL ASSESSMENT OF LASER IRRADIATION Annual Progress Report, 1 Jul. 1977 - 30 Jun. 1978

D. O. ROBBINS Jun. 1978 20 p

(Contract DAMD17-75-C-5008; DA PROJ. 3E1-62777-A-878)

(AD-A139490) Avail: NTIS HC A02/MF A01 CSCL 06R

We have studied the effects of low level coherent light on tectal neural activity in *Pseudemys*. Irreversible changes in spectral sensitivity and receptive field characteristics were obtained following exposure to coherent light. These effects with coherent light were more significant than the effects of either time-averaged or incoherent light of equal quantal retinal irradiance.

Author (GRA)

N84-25274# Ohio Wesleyan Univ., Delaware. Dept. of Psychology.

FUNCTIONAL ASSESSMENT OF LASER IRRADIATION Annual Progress Report, 1 Jul. 1976 - 30 Jun. 1977

D. O. ROBBINS Jun. 1977 11 p
(Contract DAMD17-75-C-5008; DA PROJ. 3A1-61102-B-71-P)
(AD-A139507) Avail: NTIS HC A02/MF A01 CSCL 06R

Changes in rhesus spectral and white light acuity following brief (100 msec) laser (647 nm) exposure have been measured. Permanent loss in spectral acuity occurred at an exposure level where white light acuity was still recoverable. These data suggest that postexposure spectral acuity functions reflect altered foveal function rather than total foveal disruption. Author (GRA)

N84-25275# Argonne National Lab., Ill. Chemistry Div.

ENERGY TRANSFER IN REAL AND ARTIFICIAL PHOTOSYNTHETIC SYSTEMS

J. E. HUNT, J. J. KATZ, and J. C. HINDMAN 1984 25 p refs
Presented at the US-Japan Information Exchange Seminar on Photochem. Energy Solar Conversion, Okazaki (Japan), 12 Mar. 1984

(Contract W-31-109-ENG-38)

(DE84-007278; CONF-840389-1) Avail: NTIS HC A02/MF A01

A comparative study of the fluorescence emitted by three photosynthetic organisms (chlorella, tribonema, and anacystis) and the fluorescence of some model systems selected for study by criteria described below are reported. Light emission was studied as a function of excitation wavelength and of temperature. Low temperature fluorescence studies on photosynthetic organisms and chloroplast preparations provide the chief experimental support for the existence of a photosynthesis II in green plants, and fluorescence at low temperatures was used as the principal source of information on energy flow between the photosynthetic pigments. The nature and functional aspects of PSII and the course of energy transfer in the photosynthetic apparatus are highly pertinent to the oxygen evolution in green plant photosynthesis. DOE

N84-25589*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

LABELED CELLS AS RESEARCH, DIAGNOSTIC AND THERAPEUTIC TOOLS

In its Nonaerospace Uses of JPL Technol. p 4-5 Sep. 1983

Avail: NTIS HC A03/MF A01 CSCL 06C

Scientists at JPL have developed chemical and biological techniques using microspheres filled with drugs, electron-opaque metals, or radioactive, fluorescent, magnetic or electrically charged materials to label specific groups of cells. Synthetic polymeric microspheres are coupled with specific antibodies to form reagents called immunomicrospheres, which can seek out and attach themselves to any specific group of cells. These cell-labeling techniques, therefore, open new avenues not only to the basic study of cells but also to the diagnosis and treatment of many diseases, including cancer. B.W.

N84-25590*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

COMPUTER-ASSISTED CHROMOSOME ANALYSIS

In its Nonaerospace Uses of JPL Technol. p 6-7 Sep. 1983

Avail: NTIS HC A03/MF A01 CSCL 06C

Scientists and engineers at JPL have developed an Automated Light Microscope System (ALMS) that can be used automatically, rapidly, accurately, and routinely to scan, measure, and classify the 46 human chromosomes. The digital image-processing device can operate with either homogeneously stained or Trypsin-Giemsa banded chromosome preparations. This information, which can be presented to physicians in the conventional form of a karyotype, can be a time-saving and cost-effective tool to research laboratories engaged in basic research in genetics, as well as to hospitals and clinical laboratories for the prevention and diagnosis of various human abnormalities due to chromosomal defects. The JPL technology was transferred to the City of Hope National Medical Center in Duarte, California, for the generation of an automatic chromosome-specimen-preparation system. B.W.

N84-26271# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

THE INITIAL ORIENTATION OF HOMING PIGEONS ON THE MAGNETIC EQUATOR, WITH AND WITHOUT SUN COMPASS

R. RANVAUD, K. SCHMIDT-KOENIG (Tubingen Univ., West Germany), J. KIEPENHEUER (Tubingen Univ., West Germany), and O. C. GASPAROTTO (Sao Paulo Univ., Brazil) May 1984 9 p refs Submitted for publication

(INPE-3104-PRE/503) Avail: NTIS HC A02/MF A01

The homing behavior of pigeons at the magnetic equator, where the field lines are horizontal, should provide either no magnetic compass or, an axial compass with a 180 deg ambiguity was observed. Pigeons released near noon were deprived of their Sun compass. It is found that the initial orientation of all groups of birds tests was significantly nonrandom, which indicates some form of navigation is still possible under all the experimental conditions. The bearings chosen by the noon birds, however, are different from those chosen by birds released in the morning or in the afternoon, which emphasizes central importance of the Sun compass. E.A.K.

N84-26272# Office of Technology Assessment, Washington, D.C.

COMMERCIAL BIOTECHNOLOGY: AN INTERNATIONAL ANALYSIS

Jan. 1984 607 p refs

(PB84-173608; OTA-BA-218; LC-84-601000) Avail: NTIS HC A99/MF A01 CSCL 06B

The competitive position of the United States relative to Japan and four European countries - the Federal Republic of Germany, the United Kingdom, Switzerland, and France - in the commercial development of new biotechnology is assessed. Japan and other countries identified new biotechnology as a promising area for economic growth and have therefore invested quite heavily in R&D in this field. Congressional policy options for improving U.S. competitiveness in new biotechnology are identified. The industrial use of recombinant DNA (rDNA), cell fusion, and novel bioprocessing techniques, are emphasized. GRA

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

A84-33608

SPECTRAL SENSITIVITY AND WAVELENGTH DISCRIMINATION OF THE HUMAN PERIPHERAL VISUAL FIELD

J. A. VAN ESCH, E. E. KOLDENHOF, A. J. VAN DOORN, and J. J. KOENDERINK (Utrecht, Rijksuniversiteit, Utrecht, Netherlands) Optical Society of America, Journal, A: Optics and Image Science (ISSN 0740-3232), vol. 1, May 1984, p. 443-450. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek. refs

Spectral sensitivity and wavelength discrimination are determined along the nasal horizontal meridian of the human peripheral retina. The target size as a function of eccentricity is varied according to a particular cortical magnification factor. Spectral sensitivity is measured by flicker photometry parameterized for the flicker frequency (10-20 Hz) and is found to be independent of the eccentricity (0-80 deg) for 20-Hz flicker photometry after correction of the foveal-spectral sensitivity for macular pigment absorption. This 20-Hz function is chosen as being representative for the peripheral luminous-efficiency function and is used in the wavelength-discrimination experiments. The peripheral retina can perform wavelength discrimination up to an eccentricity of 80 deg. If field-size scaling according to the eccentricity-dependent cone density, the cortical magnification factor, or the reciprocal of the

interganglion cell distance is applied, then wavelength-discrimination performance from 8 deg to 80 deg eccentricity is roughly the same. Foveal wavelength discrimination is considerably better than peripheral wavelength discrimination.

Author

A84-33610

TEMPORAL SENSITIVITIES RELATED TO COLOR THEORY

D. VARNER (Washington, University, Seattle, WA), D. JAMESON, and L. M. HURVICH (Pennsylvania, University, Philadelphia, PA) Optical Society of America, Journal, A: Optics and Image Science (ISSN 0740-3232), vol. 1, May 1984, p. 474-481. refs

Sensitivities of color-normal observers to temporal variations in stimulus luminance and chromaticity were measured for sine-wave stimuli between 1.5 and 20 Hz. Clear differences were found in observers' sensitivities to isochromatic luminance variations and to isoluminous chromaticity variations for wavelength pairs selected to test temporal discriminability along the red-green and yellow-blue dimensions, respectively. Despite interobserver differences in individual red-green functions, a given observer's sensitivity could be described by a single curve shape specific to that observer. Overall sensitivity for yellow-blue was less than that for red-green for all observers. Differences in curve shape between red-green and yellow-blue functions are found for individual observers, but group averages reveal that the differences are not systematic. Red-green temporal sensitivity is largely unaffected by adapting backgrounds in red-green equilibrium but is attenuated at low frequencies by nonequilibrium backgrounds of the same luminance. Isochromatic luminance sensitivity is largely independent of the adapting backgrounds, but heterochromatic luminance modulation functions undergo expected changes in form.

Author

A84-33623

ACCELERATION PERCEIVED WITH DYNAMIC VISUAL NOISE

Y. Y. ZEEVI (Technion - Israel Institute of Technology, Haifa, Israel; MIT, Cambridge, MA) and A. MEDINA (MIT, Cambridge, MA) Optical Society of America, Journal, A: Optics and Image Science (ISSN 0740-3232), vol. 1, May 1984, p. 562-564. Research supported by the Technion - Israel Institute of Technology. refs (Contract F33615-81-K-0011)

The velocity of apparent movement induced by a dynamic visual noise (DVN) version of the Pulfrich effect increases during tracking of the perceived moving textured plane, giving rise to a percept of visual acceleration. Recorded eye movements show consistent acceleration, with a maximum velocity ten times greater than that estimated during fixation of a stationary point superimposed upon the DVN. This gradual increase may be due to continual updating by the efferent copy of the oculomotor control signal that closes a positive-feedback loop. The component of the perceived velocity induced by the DVN is, however, independent of eye velocity, and thus the oculomotor unity negative-feedback control loop is functionally opened.

Author

A84-33720

MANUAL ON THE PHYSIOLOGY OF WORK [RUKOVODSTVO PO FIZIOLOGII TRUDA]

Z. M. ZOLINA, ED. and N. F. IZMEROV, ED. Moscow, Izdatel'stvo Meditsina, 1983, 528 p. In Russian.

An examination of the goals, problems, and significance of work physiology includes such current problems as nervous overload influenced by monotony and hypodynamia. Industrial investigations served as the basis for methodical approaches to an analysis of the physiological mechanisms at the foundation of work activity. Other topics include the functions of the motor apparatus and internal organs in work processes; exercise and fatigue; the physiology of mental work; and the physiological and hygienic features of work in hyperbaric conditions and space. Particular attention is given to the rational organization and optimization of labor activity in modern industrial conditions. Ergonomic aspects of the rationalization of labor processes, work and recreation, and criteria for a graded classification of heavy

and high-stress work are also discussed. No individual items are abstracted in this volume

J.N.

A84-34001

THE EFFECT OF TESTING METHOD ON STEREOANOMALY

R. PATTERSON and R. FOX (Vanderbilt University, Nashville, TN) Vision Research (ISSN 0042-6989), vol. 24, no. 5, 1984, p. 403-408. refs

(Contract NIH-EY-00590-17; N00014-76-C-1101)

Previous tests of stereoanomaly (a deficit in stereopsis for a given disparity direction, crossed or uncrossed) have employed stimuli in which physical contours are presented with large disparities at exposure durations too brief for eye movements. This study investigated stereoanomaly using alternative testing methods with two types of stimuli: (1) stereoscopic contours formed from dynamic random-element stereograms presented both briefly and continuously, and (2) afterimages of retinally disparate physical contours. The results from three experiments show that most subjects who are classified as stereo-anomalous under conditions of brief exposure perform normally under conditions that allow long inspection periods while eliminating eye movements. These results suggest that anomalies in stereopsis previously reported may depend on the method of testing rather than on deficits in underlying neural mechanisms.

Author

A84-34144

NEUROHUMORAL REGULATION OF IMMUNE HOMEOSTASIS DURING ADAPTATION TO EXTREME LOADS ACCORDING TO A MODEL OF PRESENT-DAY SPORTS [NEIRO-GUMORAL'NAIA REGULIATSIIA IMMUNOGO GOMEOSTAZA V PROTSESSE PRISPOSOBLENIIA K EKSTREMAL'NYM NAGRUZKAM NA MODELI SOVREMENNOGO SPORTA]

G. N. KASSIL, V. A. LEVANDO, R. S. SUZDALNITSKII, B. B. PERSHIN, and S. N. KUZMIN (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 275, no. 2, 1984, p. 506-509. In Russian. refs

A84-34592

ROLE OF PHYSICAL EXERCISE IN ARTIFICIAL HEAT ADAPTATION [ROL' FIZICHESKOI NAGRUZKI V ISKUSSTVENNOI TEПLOVOI ADAPTATSII]

A. T. MARIANOVICH, V. D. BAKHAREV, A. N. GLUSHKO, M. B. GRUZDOV, and A. M. ULASHOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), March 1984, p. 48-50. In Russian. refs

An experimental investigation was conducted with the goal of shortening the indicated time periods associated with present methods of artificial heat acclimatization for military personnel. Eight healthy male subjects 30-35 years of age were subjected to five successive daily 2-hour exposures at 49 C, 20 percent relative humidity, and with air moving at 0.5 m/s. The exposures were divided into alternating 10-minute periods of exercise on a bicycle ergometer at 50-100 V and of self-evaluation and psychophysiological testing. The bicycle load was predetermined for each exercise period so that a core temperature of 38.5 C was quickly reached and maintained. In comparison with a control group subjected to much lighter loads, the test group experienced less discomfort and sensation of heat on the fifth day of adaptation, but displayed less self-assurance and interest in work, and decreased heart rate. Intensified physical exercise gave no advantages to the organism in maintaining a heat balance.

J.N.

A84-34594

FIRST AID AND TREATMENT OF PATIENTS WITH CRITICAL CLOSED CRANIOCEREBRAL TRAUMA IN EXTENDED-CRUISE CONDITIONS [NEOTLOZHNAIA POMOSHCH' I LECHENIE BOL'NYKH S TIAZHELOI ZAKRYTOI CHEREPNO-MOZGOVOI TRAVMOI V USLOVIIAKH DLITEL'NOGO PLAVANIIA]

G. A. AKIMOV, N. I. KOMANDENKO, and V. D. DEMENKO Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), March 1984, p. 55-57. In Russian. refs

A84-34701**EFFECT OF AGING ON VENTILATORY RESPONSE TO EXERCISE AND CO₂**

M. J. BRISCHETTO, R. P. MILLMAN, D. D. PETERSON, D. A. SILAGE, and A. I. PACK (Pennsylvania University Hospital, Philadelphia, PA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1143-1150. refs
(Contract NIH-HL-08805)

The relationship between ventilation and increased CO₂ production during steady-state exercise at several work levels below the anaerobic threshold was studied in subjects 67-79 years old and 22-37 years old. The ventilatory response to inhaled CO₂ at rest was also measured. It was determined that the increase in the ventilatory response to exercise in the elderly subjects was not produced by arterial O₂ desaturation or increased lactic acidosis during exercise, but that compensation for increased physiological dead space could be the effector. The ventilatory response to hypercapnia was less in one group of the elderly subjects than in the younger subjects, through the elderly's response to ventilatory exercise was greater. It was concluded that exercise hypernea is caused by neural mechanisms different from those subserving the response to modified activity of the peripheral or central chemoreceptors. C.M.

A84-34702**LEVEL OF PHYSICAL FITNESS AND ADIPOCYTE LIPOLYSIS IN HUMANS**

J. P. DESPRES, C. BOUCHARD, R. SAVARD, A. TREMBLAY, M. MARCOTTE, and G. THERIAULT (UniversiteLaval, Sainte-Foy, Quebec, Canada) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1157-1161. Sponsorship: Fonds pour la Formation de Chercheurs et l'Action Concertee-Quebec and Natural Sciences and Engineering Research Council of Canada. refs
(Contract FCAC-EQ-1330; FCAC-CE-29; NSERC-E-6227; NSERC-G-0850; NSERC-A-8150)

In order to determine the amount of physical training needed to produce changes in adipose tissue lipolysis, fat cell size and the response of isolated adipocytes to a maximal epinephrine challenge were studied in three groups of males: sedentary subjects, four month trained subjects, and well-trained long-distance runners. It was determined that high adipocyte lipolysis is related to increased aerobic power and that this phenomenon is dissociated from alteration in fat deposits. No relationship was exhibited between fat cell lipolysis and maximal aerobic power in subjects with high maximal aerobic power. Also noted was that four months of aerobic training could induce maximal adaptation of suprailiac fat cell epinephrine-stimulated lipolysis. C.M.

A84-34704**EFFECT OF TRAINING ON BLOOD LACTATE LEVELS DURING SUBMAXIMAL EXERCISE**

B. F. HURLEY, J. M. HAGBERG, W. K. ALLEN, D. R. SEALS, J. C. YOUNG, R. W. CUDDIHEE, and J. O. HOLLOSZY (Washington University, St. Louis, MO) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1260-1264. refs

In order to determine whether endurance exercise training produces a lower blood lactate concentration at the same relative work rate, eight untrained males were examined before and after a 12 week exercise program. It was found that training effected a 26 percent increase in maximum oxygen uptake, and that lactate concentrations at the same relative exercise intensities in the 55-75 percent of maximum oxygen uptake range were considerably reduced after training. It was concluded that adaptations to training that increase maximum oxygen uptake were in some respects dissociated from the adaptations producing lower blood lactate levels during submaximal exercise. C.M.

A84-34705**REFLEX REGULATION OF SWEAT RATE BY SKIN TEMPERATURE IN EXERCISING HUMANS**

J. M. JOHNSON, D. S. OLEARY, W. F. TAYLOR, and M. K. PARK (Texas, University, San Antonio, TX) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1283-1288. refs
(Contract NIH-HL-20663)

Waterperfused suits that quickly raise skin temperature (T_{sk}) during exercise were used to study the effect of T_{sk} temperature on sweat rate (SR) and forearm skin blood flow (SkBF). For a temperature rise of 4.2 ± or - 0.3 C, SR increased by 0.44 ± or - 0.09 mg/sq cm/min and SkBF increased by 3.27 ± or - 0.42 ml/100ml/min. Also noted was that for lower levels of T_{sk}, a steep relationship of SR to T_{sk} existed, which became less steep for T_{sk} greater than 33 C. A clear reflex effect of rising T_{sk} and SR was demonstrated and shown to be more consistent during exercise than during rest. The effect was attributed to T_{sk} influencing the internal temperature threshold for the initiation of sweating or cutaneous vasodilation. C.M.

A84-34706**METABOLIC AVAILABILITY OF GLUCOSE INGESTED 3 H BEFORE PROLONGED EXERCISE IN HUMANS**

B. JANDRAIN, G. KRZENTOWSKI, F. PIRNAY, F. MOSORA, M. LACROIX, A. LUYCKX, and P. LEFEBVRE (Liege, Universite, Liege, Belgium) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1314-1319. Research supported by the Fonds National de la Recherche Scientifique, Fonds de la Recherche Scientifique Medicale and Fonds de la Recherche Fondamentale Collective of Belgium. refs

Naturally labeled C-13 glucose was used to examine the degree to which a 100-g oral load of glucose given three hours before a four hour exercise bout was oxidized. It was shown that more than two-thirds of the labeled carbon atoms were recovered during the four hour exercise period, and that approximately 67.5 g/4 hours were recovered in the form of expired CO₂. Exogenous glucose oxidation was approximately 11.3 ± or - 0.7 g during the three hour rest period and rose to 18.9 ± or 2.2 g/30 min within the first 30 minutes of exercise. It was concluded that the glucose ingested three hours before exercise was a readily available energy source for subsequent exercise, and that blood glucose was maintained within normal limits throughout the exercise period. C.M.

A84-34709**THERMAL RESPONSES DURING ARM AND LEG AND COMBINED ARM-LEG EXERCISE IN WATER**

M. M. TONER, M. N. SAWKA, and K. B. PANDOLF (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1355-1360. refs

The effects of arm (A), leg (L), and combined arm-leg (AL) exercise on the physiological factors contributing to heat transfer during exercise in water at 20, 26, and 33 C were investigated. It was found that final metabolic rates for A, L, and AL exercise were similar between exercise type for each water temperature, during low-intensity exercise. However, especially in cool and cold water, final rectal temperatures were lower when the low-intensity exercise was performed by A and AL as compared to only L. This finding was attributed to increased conductive and convective heat transfer for A exercise during water immersion. C.M.

A84-34710**ALBUMIN-INDUCED PLASMA VOLUME EXPANSION - DIURNAL AND TEMPERATURE EFFECTS**

R. W. HUBBARD, W. T. MATTHEW, D. HORSTMAN, R. FRANCESCONI, M. MAGER, and M. N. SAWKA (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1361-1368. refs

Twenty-six males were administered 25 or 50 g of intravenous albumin and were exposed to either thermoneutral or hot/dry environments to determine the significance of cutaneous vasodilation in the plasma volume expansion process and any increase in plasma volume caused by passive heat exposure. A circadian pattern of plasma volume expansion and contraction was demonstrated, and a rapid expansion of plasma volume was produced by the hyperoncotic albumin solution infusions. One hour after infusion, a 25 g dose effected the following expansions: 379 + or - 102 ml in the heat, and 301 + or - 160 ml at room temperature. A 50 g dose caused expansions of 479 + or - 84 ml in the heat, and 427 + or - 147 ml at room temperature. A mechanism for the persistent increase in plasma volume during heat acclimatization was suggested. C.M.

A84-34711**EFFECTS OF AIRFLOW AND WORK LOAD ON CARDIOVASCULAR DRIFT AND SKIN BLOOD FLOW**

J. D. SHAFFRATH and W. C. ADAMS (California, University, Davis, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, May 1984, p. 1411-1417. refs

Eight moderately trained males performed 70 minute bouts of cycle ergometry in a 2 x 2 assortment of airflows (less than 0.2 and 4.3 m/s) and relative work loads (43.4 and 62.2 percent maximal oxygen uptake) for a study concerning the relationship of cardiovascular drift (CVD) and changes in the cutaneous circulation. Parameters measured included cardiac output, heart rate, mean arterial pressure, skin blood flow, skin and rectal temperatures, and pulmonary gas exchange. The data demonstrated that CVD transpired only in situations that combined metabolic and thermal circulatory demands. It was proposed that as splanchnic reserves of vascular volume became drained, progressive redistribution of blood volume into the cutaneous circulation interfered with CVD and consequently triggered CVD. C.M.

A84-34962* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

EXPERIMENTAL STUDY OF PULSATILE AND STEADY FLOW THROUGH A SMOOTH TUBE AND AN ATHEROSCLEROTIC CORONARY ARTERY CASTING OF MAN

Y. I. CHO, L. H. BACK, R. F. CUFFEL (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), and D. W. CRAWFORD (Southern California, University, Los Angeles, CA) *Journal of Biomechanics* (ISSN 0021-9290), vol. 16, no. 11, 1983, p. 933-946. refs
(Contract NAS7-100)

A84-35673**MOTOR EVOKED POTENTIALS IN DIFFERENTIAL PSYCHOPHYSIOLOGY [MOTORNYE VYZVANNYE POTENTIALY V DIFFERENTIAL'NOI PSIKHOFIZIOLOGII]**

T. F. BAZYLEVICH Moscow, Izdatel'stvo Nauka, 1983, 144 p. In Russian. refs

The use of motor evoked potentials (MEP) for the study of individual-topological features of the human brain is investigated. Topics covered include the neurophysiological nature of MEP; the reflection of the force-sensitivity characteristic of the nervous system in parameters of motor evoked potentials of passive movement (MEPP); and the integrity of symptoms of the general force-sensitivity characteristic. Particular attention is given to the heterogeneity of MEPP components, individual features of MEPP dynamics under functional loads, and the topological determinants

of readiness potentials engaged in probability-prediction activity.

J.N.

A84-35677**ATLAS OF CLINICAL PHONOCARDIOGRAPHY [ATLAS KLINICHESKOI FONOKARDIOGRAFI]**

V. V. SOLOVEV and G. I. KASSIRSKII Moscow, Izdatel'stvo Meditsina, 1983, 296 p. In Russian. refs

The principles and methodology of phonocardiographical investigation are studied, and the principal parameters of normal phonocardiographs (PKG) and their pathological variations are examined. PKGs associated with acquired and congenital heart defects and with corrective surgery of such defects are reviewed. Particular attention is given to open arterial duct, open arterioventricular canal, Fallo's tetrad, and Ebstein's anomaly. Also considered are mitral valve insufficiency and mitral stenosis, stenosis of the aortic ostium, idiopathic hypertrophic subaortic stenosis, aortic coarctation, and tricuspidal valve insufficiency. Further attention is given to myocardial infarction, myocarditis, pericarditis, and atherosclerotic cardiosclerosis. J.N.

N84-25248# Joint Publications Research Service, Arlington, Va. SOME ASPECTS OF DOSIMETRY IN STUDIES OF BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION

V. N. KARPOV, A. A. GALKIN, and B. I. DAVYDOV *In its USSR Rept.: Space Biol. and Aerospace Med.*, v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 3-26 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 7-22

Avail: NTIS HC A08

In order to clarify mechanisms of biological reactions, the absorption and spatial distribution of the absorbed electromagnetic energy are studied. The procedures and methods of calculating the electromagnetic energy absorption of biological specimens exposed to nonionizing electromagnetic irradiation in a wide frequency range (0 to 300 GHz) are described. Also presented are formulas and plots used in calculating the specific absorption of the dose rate by biological specimens, with the inclusion of resonance polarization of the incident electromagnetic wave, presence of reflecting surfaces and grounding. The extrapolation of the average energy absorption from one animal species to another and to man is discussed. The notion of the irradiation quality coefficient is introduced. The values of the coefficients are given as related to the irradiation frequency and polarization type. A mathematical relation is offered to determine the safety of a complex spectrum of electromagnetic irradiation. Author

N84-25249# Joint Publications Research Service, Arlington, Va. MAIN RESULTS OF MEDICAL STUDIES ON Salyut-6--SOYUZ PROGRAM

Y. I. VOROBYEV, O. G. GAZENKO, A. M. GENIN, N. N. GUROVSKIY, A. D. YEGOROV, and Y. G. NEFEDOV *In its USSR Rept.: Space Biol. and Aerospace Med.*, v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 27-31 16 May 1984 Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 22-25 -

Avail: NTIS HC A08

In 1977 to 1981 the Soviet Union launched 18 manned space missions under the Salyut 6--Soyuz program which included five flights of prime crews for 96, 140, 175, 185 and 75 days and eleven flights of visiting crews. Altogether 30 cosmonauts, including 9 crewmembers from other than the USSR socialist countries, took part in the program. Emphasis was given to the medical investigations, since their purpose was not only to assess the health status of the crew members and to investigate their responses to prolonged weightlessness, but also to identify the maximum allowable flight time. Author

N84-25250# Joint Publications Research Service, Arlington, Va.
BLOOD PLASMA AMINO ACID LEVELS IN COSMONAUTS BEFORE AND AFTER 175-DAY MISSION ABOARD SALYUT-6

I. G. POPOV and A. A. LATSKEVICH *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 32-41 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 26-33

Avail: NTIS HC A08

Measurements of 17 free amino acids were performed before and after the Salyut-6 175 day spaceflight. At R+1 both crewmembers showed a reduced concentration of most amino acids as compared to the preflight level. By R+7 the preflight status was not yet reached. Enrichment of the space diet with the following essential amino acids is recommended: preflight-methionine, leucine, isoleucine, phenylalanine, lysine, threonine, cystine and tyrosine; postflight-lysine threonine, valine, leucine, isoleucine, phenylalanine, methionine and cystine.

Author

N84-25251# Joint Publications Research Service, Arlington, Va.
EVALUATION OF CHANGES IN HUMAN AXIAL SKELETAL BONE STRUCTURES DURING LONG-TERM SPACEFLIGHTS

G. P. STPAKOV, V. S. KAZEYKIN, A. P. KOZLOVSKIY, and V. V. KOROLEV *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 42-47 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 33-37

Avail: NTIS HC A08

Changes in the mineral content of the left heel bone of the Salyut-6 crewmembers who made 75 to 184 day flights were measured by direct photon absorptiometry. The postflight results were compared with the predicted rate of bone atrophy. This parameter was derived from the data concerning variations in the mineral content of spongy bones of men and animals exposed to actual and simulated weightlessness for various time intervals. The efficiency of countermeasures against the adverse effect of weightlessness on bones was assessed. Crewmembers with a high content of minerals in spongy structures of the axial skeleton and a low basal metabolism should be selected for prolonged space missions.

Author

N84-25252# Joint Publications Research Service, Arlington, Va.
STUDY OF ERYTHROCYTE ADHESION IN COSMONAUTS

A. A. LENTSNER, V. I. BRILIS, T. A. BRILENE, K. P. LENTSNER, V. M. SHILOV, N. I. LIZKO, G. D. SYRYKH, and V. I. LEGENKOV *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 48-51 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 38-40

Avail: NTIS HC A08

The adhesive property of red blood cells of cosmonauts was investigated during various stages of their professional activity. The study was carried out using three test microorganisms: *L. casei* A6, *L. brevis* A16 and *L. buchneri* A14. The results show that the adhesive property of red blood cells varies during different periods of spaceflight. In contrast to long duration flights, short term flights cause greater changes in this parameter. During readaptation the adhesion of red blood cells was significantly increased as compared to that preflight and immediately postflight.

Author

N84-25254# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF CHANGES IN METABOLIC AND ENDOCRINE PROCESSES IN HELICOPTER CREWS DURING COMMERCIAL FLIGHTS

I. M. NOSOVA, T. A. DROBYSHEVSKAYA, and N. A. OSADCHIYEVA *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 57-62 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 43-47

Avail: NTIS HC A08

Metabolic and hormonal variations of crewmembers of Mi-6 and Mi-8 helicopters were investigated. The investigation was performed on 61 pilots, including 18 in the hot and 43 in the cold climate. The following parameters were measured before and after flight: nonesterified fatty acids, lactic acid, insulin, and cortisol in blood, and catecholamines and cortisol in urine. In the hot climate the content of nonesterified fatty acids, lactic acid and insulin increased. The renal excretion of catecholamines and cortisol grew drastically. In the cold climate nonesterified fatty acids increased postflight. Insulin, catecholamines and cortisol tended to grow.

Author

N84-25255# Joint Publications Research Service, Arlington, Va.
CHOICE OF PSYCHOPHYSIOLOGICAL CRITERION TO ASSESS WHOLE-BODY LOW-FREQUENCY VIBRATION

Y. N. KAMENSKIY *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 63-67 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 47-50

Avail: NTIS HC A08

In response to whole-body vibration of 10 Hz and acceleration of 1 m/sq sec applied for 1 hour the psychophysiological status varies in two stages. At stage 1 physiological functions are disturbed (primary disorder) and at stage 2 they recovery partially or completely (compensation and adaptation). The level of compensatory and adaptive reactions is used as a tolerance criterion of the vibration effect with respect to its magnitude and duration. The primary reaction can be used as such a criterion when the functions under study are exposed to direct biomechanical effects of vibration.

Author

N84-25256# Joint Publications Research Service, Arlington, Va.
EVALUATION OF SOME HEMODYNAMIC PARAMETERS OF PILOTS DURING FLIGHTS

B. S. BEDNENKO, G. N. GRECHIKHIN, and A. N. KOZLOV *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 68-73 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 50-54

Avail: NTIS HC A08

Coronary circulation and systolic and diastolic time intervals were measured in one-seat high maneuverability aircraft pilots during 22 flights. The effective coronary blood flow values varied significantly and reached maximum during landing. In some cases these changes were very large, suggesting a low level of conditioning and physiological reserves. It is recommended to monitor coronary circulation inflight.

Author

N84-25258# Joint Publications Research Service, Arlington, Va.
ADAPTIVE EFFECTS OF REPEATED IMMERSION ON MAN

Y. B. SHULZHENKO, V. G. KOZLOVA, Y. A. ALEKSANDROVA, and K. A. KUDRIN *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 78-82 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 57-59

Avail: NTIS HC A08

The effect of intermittent immersion on orthostatic tolerance, fluid electrolyte metabolism and neuromuscular system was investigated. Control and experimental immersions were used. Experimental immersion was preceded by 12 hour exposure to

immersion at night for three times. Experimental immersion was accompanied by reduced renal excretion of fluid, sodium and potassium and normalization of the muscle tone. After experimental immersion orthostatic tolerance approached the control level. The difference in the physiological effects of control and experimental immersions seem to be associated with the capacity of the human body to adapt to immersion, if it is applied intermittently. Author

N84-25259# Joint Publications Research Service, Arlington, Va.
CIRCADIAN RHYTHM OF HUMAN HEART RATE DURING ANTIORTHOSTATIC TESTS

L. LHAGWA *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 83-87 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 60-63

Avail: NTIS HC A08

The study of diurnal variations of heart rate of seven healthy volunteers exposed to head down tilting (-8 degrees) demonstrated that the absolute value decreased at the peak phase and in the daytime and increased at night. The amplitude of the diurnal variations declined. The experimental data indicate that heart rate may decrease in the morning and in the daytime beginning with the first days of the head down position. Sometimes this decrease may be delayed and develop from seven to twelve days later.

M.A.C.

N84-25260# Joint Publications Research Service, Arlington, Va.
EFFECT OF WORKING IN TWO SHIFTS ON CIRCADIAN RHYTHM OF HEART RATE

A. I. SHCHUKIN *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 88-93 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 63-66

Avail: NTIS HC A08

Circadian variations of the heart rate of 58 male workers, aged from 18 to 21, were investigated. The builders were from different geographical areas and their work record at the construction site was two months, one or two years. The builders whose work record was two months showed an inverted heart rate. The normal increase in the daytime and decrease at night was reversed and night values were greater than daytime values. This can be considered as a manifestation of anxiety due to an early change in the social, geographical and everyday environment. The builders whose work record was one or two years did not show such changes. The workers who worked in two shifts showed larger amplitudes in the circadian rhythm of heart rate, irrespective of their work record. This can be regarded as a manifestation of stress due to the night shift or continuous changes from one shift to the other.

M.A.C.

N84-25262# Joint Publications Research Service, Arlington, Va.
MORPHOLOGICAL STUDY OF PRIMATE MUSCLE FIBERS AND MICROCIRCULATION DURING HEAD-DOWN HYPOKINESIA

Y. I. ILINA-KAKUYEVA *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 100-103 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 71-73

Avail: NTIS HC A08

Primates were exposed to head down tilt for seven and 12 days. The body mass and muscle mass decreased, muscles became atrophic, and the number of functioning capillaries lessened. Out of the three muscles examined (gastrocnemius, soleus, and biceps brachii), the soleus muscle showed the greatest changes. In spite of blood redistribution and blood pooling in the upper body, seen during autopsy, no blood displacement occurs in the microcirculatory bed. The decrease in the number of functioning capillaries is normally regarded as a change that is concomitant with muscle atrophy.

M.A.C.

N84-25263# Joint Publications Research Service, Arlington, Va.
STRUCTURAL DISTINCTIONS OF THYROID C CELLS AND PARATHYROID GLANDS OF PRIMATES DURING HEAD-DOWN HYPOKINESIA

G. I. PLAKHUTA-PLAKUTINA, Y. A. SAVINA, N. P. DMITRIYEVA, Y. A. AMIRKHANYAN, G. S. BELKANIYA, and D. S. TAVADYAN *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 104-109 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 73-77

Avail: NTIS HC A08

Eight monkeys were exposed to head down tilt for seven days and to clinostatic hypokinesia for seven days with subsequent 12 day head down tilt. The C cells found in the thyroid gland and the parathyroid glands of five control and eight experimental monkeys were investigated histologically, morphometrically and electron microscopically. On the seventh tilt day the C cell population increased, their nuclei grew significantly, synthesis activated, and secretory granules accumulated by day 19 most C cells were in the secretion stage. Morphological signs of an increased functional activity of the thyroid gland were seen on experimental day seven and those of the parathyroid gland on day 19, both in light and electron microscopies. Taking into account the antagonism of C cells and parathyroid glands, it is assumed that the hypocalcemic effect of calcitonin plays a part in the stimulation of parathyroid glands during head down tilt.

M.A.C.

N84-25268# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF EXAM STRESS ON CARDIAC FUNCTION OF STUDENTS DIFFERING IN LEVEL OF PHYSICAL ACTIVITY

N. Y. VOLKIND *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 126-129 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 86-87

Avail: NTIS HC A08

Parameters of cardiac function are studied during final exams in students, athletes and unconditioned subjects. The EKG is recorded in the second standard lead, in seated position. Heart rate is calculated, and the blood pressure is measured. The EKG parameters and blood pressure recorded on the morning after the exams served as the control. Data for 20 people from each group are submitted to statistical processing. High ranking athletes are highly resistant to the stress of examinations. This is indicated by the moderate changes in their cardiac activity during the exams. Unconditioned students present more marked changes in cardiac activity during exams. These changes, as in the athletes, progress as the moment of giving answers draws nearer, and they gradually regress after the students receive their grades. These changes are demonstrable for a number of EKG parameters.

M.A.C.

N84-25270# Joint Publications Research Service, Arlington, Va.
REVIEW OF BOOK ON SPACE RADIOBIOLOGY

V. V. ANTIPOV and B. I. DAVYDOV *In its* USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 134-139 16 May 1984 Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 89-92

Avail: NTIS HC A08

Several theoretical theses concerning the validation of radiobiological with respect to levels of radiation to which cosmonauts are exposed during extended space flights are presented. Specific methodology and equipment used in performing radiobiological studies is explained. Topics include a history of radiobiology, physiological reaction to ionizing radiation, radiosensitivity during space flight, and a listing of several radiobiological experiments and their results.

M.A.C.

N84-25271# Joint Publications Research Service, Arlington, Va.
NEW BOOK ON METABOLISM UNDER HYPODYNAMIC CONDITIONS

Y. A. KOVALENKO and Y. I. KONDRATYEV *In its USSR Rept.:*
 Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984
 (JPRS-USB-84-004) p 140-143 16 May 1984 Transl. into
 ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v.
 18, no. 2, Mar. - Apr. 1984 p 92-94

Avail: NTIS HC A08

The results of metabolism studies in animals during experimental hypodynamia are summarized. Data on changes in protein, carbohydrate, nucleic and fluid electrolyte metabolism, as well as their regulatory systems in the case of prolonged restriction of movement are analyzed. The hypothesis of biochemical bases of pathogenesis of the hypodynamia syndrome is presented. In addition to data obtained from studies of animal metabolism, material is submitted on the influence of hypodynamia on humans, including spaceflight conditions. The experiments with animals are valuable in that they permit investigation of tissue metabolism proper on different levels. M.A.C.

N84-25276 Royal Naval Personnel Research Committee, London (England).

MOTION ILLNESS: A BIBLIOGRAPHY

C. A. MUIR Sep. 1983 118 p

(AD-A139342; SMWP-1/83; BR90380) Avail: Issuing Activity

A bibliography containing 415 citations relating to motion sickness research is presented. Particular reference is given to the prevention of motion illness by drug treatment. Limitations of the data collected to determine the relationship between motion and illness are discussed. A general review of the methods of the drug trials completed in the field of motion illness is included. Specific topics which receive consideration include: space flight stress, weightlessness, angular acceleration, linear acceleration, symptoms of motion sickness, and vestibular nystagmus. R.S.F.

N84-25277# Committee on Science and Technology (U. S. House).

BIOLOGICAL CLOCKS AND SHIFT WORK SCHEDULING

Washington GPO 1984 44 p refs Presented by the Subcomm. on Invest. and Oversight to the Comm. on Sci. and Technol., 98th Congr., 2d Sess., Jan. 1984

(GPO-29-312) Avail: Subcommittee on Investigations and Oversight

The current status of research on the effects of rotating shift work on human performance is examined. A brief survey on circadian rhythms and the problems experienced by workers on rotating shifts is presented. Suggestions for work schedules that minimize some of the problems such as insomnia, chronic fatigue, physiological ailments, and reduced alertness are included with provisions for management training in the understanding of biological clocks. M.A.C.

N84-25278# Yale Univ., New Haven, Conn. Dept. of Ophthalmology and Visual Science.

LIMITS OF PATTERN DISCRIMINATION IN HUMAN VISION Annual Report, 1 Jan. 1983 - 30 Jan. 1984

J. HIRSCH 30 Jan. 1984 51 p

(Contract F49620-83-C-0026; AF PROJ. 2313)

(AD-A139921; AFOSR-84-0183TR; AR-1) Avail: NTIS HC A04/MF A01 CSCL 05J

The studies reported in Annual Technical Report 1 were designed to probe various aspects of spatial pattern discrimination. Several important findings have emerged allowing limits of pattern discrimination to be related to structural properties of the photoreceptor lattice. First, our findings have suggested that spatial frequency discrimination exceeds resolution of the photoreceptor mosaic for spatial frequencies above approximately 4 c/deg, thus spatial frequency discrimination qualifies as a hyperacuity task. Further, spatial frequency discrimination was not a smooth function of spatial frequency, but rather showed a regularly segmented structure that appeared to be related to foveal photoreceptor center-to-center spacing. This result suggests that the

photoreceptor lattice could be the primary geometrical instrument for estimating distance or separations between stimulus features. We have developed a technique to study the structural quality of a retinal mosaic by digitizing the foveal photoreceptor lattice of a primate (*Macacca fascicularis*). Our analyses of the foveal region has revealed a very high quality hexagonal lattice with a correlation length of at least 130 photoreceptors. These results confirm that the photoreceptor lattice is constructed with sufficient structural quality to provide a source of geometrical information reflected in spatial discrimination tasks. GRA

N84-25279# Consiglio Nazionale delle Ricerche, Pisa (Italy). Inst. di Neurofisiologia.

PROCEEDINGS OF THE 6TH EUROPEAN CONFERENCE ON VISUAL PERCEPTION Final Report, 15 Aug. 1983 - 14 Feb. 1984

A. FIORENTINI 30 Nov. 1983 82 p Conf. held at Lucca, Italy, 28-31 Aug. 1983

(Contract AF-AFOSR-0263-83; AF PROJ. 2313)

(AD-A139927; EOARD-TR-84-09) Avail: NTIS HC A05/MF A01 CSCL 05J

The '6th European Conference on Visual Perception' has dealt with the following topics: spatial and temporal frequencies, color, visual physiology (cortical and subcortical), motion perception, binocular interactions, stereopsis and oculomotor proprioception. GRA

N84-25280# SRI International Corp., Menlo Park, Calif.

USAFSAM (USAF SCHOOL OF AEROSPACE MEDICINE) REVIEW AND ANALYSIS OF RADIOFREQUENCY RADIATION BIOEFFECTS LITERATURE Interim Report, 17 May 1982 - 16 Jun. 1983

L. N. HEYNICK and P. POLSON Mar. 1984 179 p

(Contract F33615-82-C-0610; AF PROJ. 7757)

(AD-A140023; USAFSAM-TR-84-6; REPT-3) Avail: NTIS HC A09/MF A01 CSCL 06R

The objectives of this project are to acquire, review, and analyze, on an ongoing basis, information on research pertaining to the biological effects of radiofrequency radiation (RFR) for the preparation of a computer data base of analyses at the USAF School of Aerospace Medicine (USAFSAM). The method in use is to: (1) select documents judged to be representative of prior and current research on various RFR-bioeffects topics, (2) analyze in detail the contents of each such document, and (3) assess the validity and significant of the results presented. In this third report, the major RFR-bioeffects topics are listed and the revised format used for analyzing each selected document is described. During the period covered by this report, 38 additional analyses were completed, for a total of 118 analyses. The texts of the additional analyses are presented in Appendix A. Since the issuance of the first two reports, the analyses contained therein have been assigned identification numbers 1 through 80, and the sequence is continued for the analyses in Appendix A. In addition, to the text, each analysis includes information for computer retrieval by authors, key words, year of publication, and RFR parameters. A master citation list of all 118 analyses completed thus far is given in Appendix B. This is arranged alphabetically by first author. GRA

N84-25281# Army Research Inst. of Environmental Medicine, Natick, Mass.

INFLUENCE OF HYDRATION LEVEL AND BODY FLUIDS ON EXERCISE PERFORMANCE IN THE HEAT

M. N. SAWKA, R. P. FRANCESCONI, A. J. YOUNG, and K. B. PANDOLF Jan. 1984 31 p

(Contract DA PROJ. 3E1-62777-A-879)

(AD-A139284; USARIEM-M-11-84) Avail: NTIS HC A03/MF A01 CSCL 06S

During exercise in the heat, sweat output often exceeds water intake resulting in hypohydration which is defined as a body fluid deficit. This fluid deficit is comprised of water loss from both the intracellular and extracellular fluid compartments. Hypohydration during exercise causes a greater heat storage and reduces endurance in comparison to euhydration levels. The greater heat

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storage is attributed to a decreased sweating rate as well as a decreased cutaneous blood flow. These response decrements have been related to both plasma hyperosmolality and a plasma hypovolemia. Subject gender, acclimation state and aerobic fitness do not alter the hypohydration response. Hyperhydration, or body fluid excess, does not appear to provide a clear advantage during exercise-heat stress, but may delay the development of hypohydration. GRA

N84-25282# Army Research Inst. of Environmental Medicine, Natick, Mass.

EFFECTS OF HEAT ACCLIMATION ON ATROPINE IMPAIRED THERMOREGULATION

M. A. KOLKA, L. LEVINE, B. S. CADARETTE, P. ROCK, and M. N. SAWKA 1983 19 p
(Contract DA PROJ. 3M1-62734-A-875)
(AD-A139292; USARIEM-M12/84) Avail: NTIS HC A02/MF A01 CSCL 06S

The effects of saline or atropine injection (2 mg, im) on eccrine sweating and performance time in seven healthy male subjects were evaluated during treadmill walking in a hot-dry environment, before and after heat acclimation. Mean skin temperature, rectal temperature, and heart rate were continuously measured. Data demonstrated that heat acclimation improves the endurance time of atropine-treated subjects in a hot-dry environment. This improvement was in part due to the potentiation of sweat gland activity enabling greater evaporative cooling for the same dose of atropine. GRA

N84-25283# Information Ventures, Inc., Philadelphia, Pa.
BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION. VOLUME 8, NUMBER 1: A DIGEST OF CURRENT LITERATURE

B. H. KLEINSTEIN Oct. 1983 115 p
(Contract N00014-83-C-0004)
(AD-A139296) Avail: NTIS HC A06/MF A01 CSCL 06R

The literature digest contains original abstracts of English and foreign-language research literature, current research summaries, news items and announcements and information on relevant meetings and conferences. Subject and author indices are provided for all literature abstracts. Original abstracts are prepared based on data presented in the text, tables, and figures in the document. Where appropriate, quantitative data such as wavelength or frequency modulation, pulse width, duty cycle, incident power density, specific absorption rate, drugs or other stimulate, exposure duration and regime, and end point are included in each abstract. GRA

N84-25284# Army Research Inst. of Environmental Medicine, Natick, Mass.

SKELETAL MUSCLE METABOLISM OF SEA-LEVEL NATIVES FOLLOWING SHORT-TERM HIGH-ALTITUDE RESIDENCE

A. J. YOUNG, W. J. EVANS, E. C. FISHER, R. L. SHARP, and D. L. COSTILL Feb. 1984 20 p
(Contract DA PROJ. 3E1-62777-A-879)
(AD-A139323; USARIEM-M-13-84) Avail: NTIS HC A02/MF A01 CSCL 06S

The influence of short-term high-altitude (HA) residence on intramuscular pH and skeletal muscle enzyme activity of sea-level (SL) residents was investigated. Vastus lateralis muscle samples were obtained by biopsy from rested subjects (n-5) at SL (50M) and on the eighteenth day of HA residence (4300 m) for determination of glycogen phosphorylase, hexokinase, malate dehydrogenase and total lactate dehydrogenase activities. A second group of subjects (n-6) performed cycle exercise of the same absolute intensity at SL and on the fifteenth day of residence at HA. The first group of subjects showed no significant changes in skeletal muscle enzyme activity after 18 days at HA. The second group of subjects were instructed to exercise for exactly 30 min, and all but one could complete the entire bout at SL. However, at HA, none could continue 30 min, and time to exhaustion was 11.9 ± 0.16 min. Resting intramuscular pH was not significantly different after HA residence as compared to

SL. The fall in intramuscular pH was less with exercise on day 15 at HA than during SL exercise. Likewise, the increase in blood lactate concentration with exercise at HA was less than at SL. These data indicate that, after 15-18 days of HA residence, limitations in exercise performance are not due to inordinate intramuscular acidosis or to changes in the activity of glycolytic and oxidative enzymes. GRA

N84-25285# Naval Medical Research Inst., Bethesda, Md.

A NON-DIMENSIONAL ANALYSIS OF CARDIOVASCULAR RESPONSE TO COLD STRESS. PART 1: IDENTIFICATION OF THE PHYSICAL PARAMETERS THAT GOVERN THE THERMOREGULATORY FUNCTION OF THE CARDIOVASCULAR SYSTEM Medical Research Progress Report, Jun. - Sep. 1983

D. J. SCHNECK 1 Sep. 1983 93 p
(Contract MR04101)

(AD-A138710; NMRI-83-51) Avail: NTIS HC A05/MF A01 CSCL 06S

Whether in combat-type situations, or during peace-time, Man constantly strives to increase the envelope of human performance capabilities. One environmental factor that appears to seriously impede such capabilities is the ambient temperature within which the performance takes place. Cold stress and/or the consequences of hypothermia can lead to adverse effects that range from severe impairment of physiological function to death, itself. The prevailing belief today is that vascular changes and tissue hypoxia are directly responsible for all types of local cold injury, and that variation in the clinical features or manifestations reflects variation in the nature of the insult and the host response. With this in mind, this study has examined the human cardiovascular system in terms of its four basic elements: The fluid (blood), the pump (Heart), the flow pipes (vascular system), and the control mechanisms (intrinsic factors, the central and autonomic nervous systems, and the endocrine system). Then, cardiovascular thermoregulation has been described in terms of how each of these elements responds to cold stress, with the ultimate intent of performing a non-dimensional analysis of the response. As a first step towards such an analysis, some 400 physical and chemical parameters that govern the thermoregulatory function of the cardiovascular system have been identified. GRA

N84-25593*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

DIGITAL IMAGE PROCESSING OF MUSCLE BIOPSIES

In its Nonaerospace Uses of JPL Technol. p 12-13 Sep. 1983
Avail: NTIS HC A03/MF A01 CSCL 06P

Scientists and engineers at JPL have designed and built digital image processing devices that can automatically, quickly, accurately, and routinely scan the strained fibers of muscle tissues to determine each muscle fiber's area, density, circumference, and intensity of color. This information, which can be presented to physicians in the form of histograms, is a powerful tool not only to research laboratories engaged in basic research in muscle biology, but also to hospitals and clinical laboratories for the diagnosis, treatment, and evaluation of various neuromuscular diseases and paralytic conditions. As an example of transfer of this technology, a JPL-developed, digital image processing system for the analysis of muscle fibers is now operating at the University of California at Los Angeles. Author

N84-25594*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ARTIFICIAL BLOOD SUBSTITUTES

In its Nonaerospace Uses of JPL Technol. p 14-15 Sep. 1983
Avail: NTIS HC A03/MF A01 CSCL 06A

Under sponsorship of the National Institutes of Health, investigators at JPL carried out the synthesis of 14 hybrid perfluorocarbon-hydrocarbon compounds as possible candidates for artificial blood substitutes. From a study of these and other perfluorocarbon compounds, rules were developed that permit the reasonably accurate prediction of a compound's vapor pressure, its ability to dissolve oxygen, and its ability to form stable emulsions

with non-ionic, polymeric surfactants. These parameters are extremely important in determining whether a compound could be a suitable candidate as an artificial blood substitute. These research results, available in the professional literature, can serve as a useful guide to any person or group contemplating the use of perfluorocarbons as potential artificial blood substitutes. Author

N84-25597*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ULTRASOUND VISUALIZATION OF CARDIOVASCULAR SYSTEMS

In its Nonaerospace Uses of JPL Technol. p 20-21 Sep. 1983
 Avail: NTIS HC A03/MF A01 CSCL 06B

A swept frequency, time delay spectroscopy, ultrasonic scanner with improved operating characteristics as compared to conventional, pulse echo ultrasonic scanners was developed. It is suggested that the ultrasonic scanner could be a powerful tool in hospitals in the diagnosis of atherosclerosis through its risk free, noninvasive, nonionizing, high resolution imaging of arteries.

E.A.K.

N84-25598*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

COMPUTER-AIDED ANALYSIS OF ATHEROSCLEROSIS

In its Nonaerospace Uses of JPL Technol. p 22-23 Sep. 1983
 Avail: NTIS HC A03/MF A01 CSCL 06E

A computer aided, image analysis system that detects and quantitatively measures atherosclerotic lesions as recorded on X-ray angiograms is described. The system provides the most accurate measurement of human femoral and coronary artery disease. This technology was used to determine the actual influence of diet, drugs, exercise, or a combination of these factors, on regression of atherosclerotic lesions. The image analysis system allows examination of angiograms taken over progressive time intervals.

E.A.K.

N84-26273 Ohio State Univ., Columbus.

THE DEVELOPMENT OF A BIDIRECTIONAL MULTI-SPEED IMPACT MODEL OF THE ADULT HUMAN THORAX Ph.D. Thesis

J. F. WEICHEL 1983 457 p

Avail: Univ. Microfilms Order No. DA8403586

An analytical computer model of a two dimensional cross section of the thorax is developed which accurately simulates measured impact response. The model uses the general system modeling program MADYNO and focuses on simulating the motion of the bony structure of the thorax when impacted from the front or side. Forces and kinematics along the axis of the spine are not considered. Values of the parameters in the model are obtained from published biomechanical data or chosen on the basis of the results of the simulation when compared with the measured response of a selected front or side impact. Boundary conditions are handled by defining the acceleration of the spine as an input to the simulation. The model is validated by simulating the response of eight other cadaver thoracic impact tests performed by the Highway Safety Research Institute. The data base includes five frontal and five side pendulum impacts to the chest with impactor speeds of 4.27 m/s (14 ft/s) and 0.91 m/s (3 ft/s).

Dissert. Abstr.

N84-26274*# Johns Hopkins Univ., Baltimore, Md. Dept. of Materials Science and Engineering.

ULTRASONIC AND OPTICAL EVALUATION OF SURGICAL IMPLANT MATERIALS AND DEVICES. A DURABILITY STUDY OF PERICARDIAL BIOPROSTHESES Technical Progress Report

P. R. SCHUSTER May 1984 103 p refs

(Contract NAG1-211)

(NASA-CR-173437; NAS 1.26:173437) Avail: NTIS HC A06/MF A01 CSCL 06B

Laser Doppler Anemometry (LDA) and accelerated fatigue testing were used in an attempt to assess the durability of two cardiac valve bioprostheses. The LDA system was used to monitor

the function of the cardiac valves over time. This was done through flow characterization in an aortic flow chamber, designed to closely simulate in vivo conditions, both in the near vicinity (sinuses of valsalva region) and also somewhat downstream (aortic region) from the valves. The accelerated fatigue tester was operated by opening and closing the valves at a rate of 1300 R.P.M., about 18 x the normal rate. The results from the two test valves indicate a definite change in the flow characteristics downstream from the valve after certain accelerated test intervals. The high velocity cross-sectional flow area seems to increase over time in use, causing a decrease in the peak velocity. The tissue became more flaccid in certain areas, and tears were apparent at about 9.4 million cycles for the Ionescu-Shiley valve and at 24 million cycles for the Carpentier-Edwards valve. The use of Doppler ultrasound as a technique for monitoring the function of bioprostheses over time in vivo is also discussed.

M.G.

N84-26275*# Baylor Coll. of Medicine, Houston, Tex. Dept. of Medicine.

A STUDY OF STRESS-FREE LIVING BONE AND ITS APPLICATION TO SPACE FLIGHT Final Report

A. LEBLANC and M. SPIRA Dec. 1983 47 p refs

(Contract NAS9-16442)

(NASA-CR-171786; NAS 1.26:171786) Avail: NTIS HC A03/MF A01 CSCL 06P

Observations of animals and human subjects in weightless space flight (Skylab and COSMOS) document altered bone metabolism. Bone metabolism is affected by a number of local and systemic factors. The calcification and growth of transplanted bone is independent of local muscle, nervous, and mechanical forces; therefore, transplanted bone would provide data on the role of local vs. systematic factors. Bone metabolism in living transplanted bone, devoid of stress, was investigated as a possible tool for the investigation of countermeasures against disuse bone loss. An animal model using Sprague-Dawley rats was developed for transplantation of femur bone tissue on a nutrient vascular pedicle. The long term course of these implants was assessed through the measure of regional and total bone mineral, blood flow, and methylene diphosphonate (MDP) uptake. Clomid, an estrogen agonist/antagonist, was shown to protect bone from disuse loss of minerals by retarding trabecular and cortical resorption.

R.S.F.

N84-26276*# National Aeronautics and Space Administration, Washington, D. C.

DEVELOPMENT OF A NEW, COMPLETELY IMPLANTABLE INTRAVENTRICULAR PRESSURE METER AND PRELIMINARY REPORT OF ITS CLINICAL EXPERIENCE

K. OSAKA, T. MURATA (Kyoto Univ.), S. OKAMOTO (Kyoto Univ.), T. OHTA, T. OZAKI, T. MAEDA, K. MORI (Kyoto Univ.), H. HANDA (Kyoto Univ.), S. MATSUMOTO (Kobe Univ.), and I. SAKAGUCHI (Nagano Keiki Seisakusho Ltd., Japan) Jul. 1982 24 p refs
 Transl. into ENGLISH from Neurol. Med. Chir. (Tokyo), v. 21, 1981 p 1051-1060 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Osaka Medical Coll., Japan

(Contract NASW-3541)

(NASA-TM-77121; NAS 1.15:77121) Avail: NTIS HC A02/MF A01 CSCL 06B

A completely implantable intracranial pressure sensor designed for long-term measurement of intraventricular pressure in hydrocephalic patients is described. The measurement principal of the device is discussed along with the electronic and component structure and sources of instrument error. Clinical tests of this implanted pressure device involving both humans and animals showed it to be comparable to other methods of intracranial pressure measurement.

R.S.F.

N84-26277# Army Research Inst. of Environmental Medicine, Natick, Mass.

ANTHROPOMETRIC CHANGES AT HIGH ALTITUDE

C. S. FULCO, A. CYMERMAN, N. A. PIMENTAL, A. J. YOUNG, and J. T. MAHER 27 Mar. 1984 22 p
(Contract DA PROJ. 3E1-62777-A-879)
(AD-A140311; USARIEM-M19/84) Avail: NTIS HC A02/MF A01 CSDL 06N

Eight men (18-25 yr) were evaluated before, during and after 18-days residence on the summit of Pikes Peak, CO (4300 m; HA) to describe the anthropometric changes associated with weight loss and to test the accuracy of a number of previously published prediction equations in assessing any alteration of the relative fat-to-lean tissue ratio during exposure to HA. Body weight (BW), ten circumference (C) and seven skinfold (SF) measurements were obtained preprandial at sea level (SL) and on days 2,4,6,9,12,16 and 18 at HA. Body density was estimated by hydrostatic weighting (HW) pre- and post-HA. BW differed from SL ($P < .01$) after day 9 at HA. HW indicated that the pre- to post-HA weight loss was partitioned into a 2.06 kg loss in fat-free body mass ($P < .001$) and an insignificant increase in fat wt (0.58 kg). Percent body fat (BF) increased from 16.6 to 17.7 ($P < .02$). After day 9 of HA, the sum of SF and C measurements increased ($P < .02$) and decreased ($P < .05$) from SL, respectively. The largest changes occurred in the chest and scapula SF and in the C of the hip, neck, calf and 2 abdominal sites. Based on the lack of concurrence with the results from the hydrostatic weightings, it was conducted that SF and C measurements and/or prediction equations do not provide an accurate assessment of the altered fat-to-lean ratio during weight loss at high altitude. GRA

N84-26278# Boston Univ., Mass. School of Medicine. **HEMATOLOGIC AND BIOCHEMICAL DATA ON HEALTHY INDIVIDUALS PARTICIPATING IN A PHYSICAL CONDITIONING PROGRAM**

E. N. SERRALLACH, R. C. DENNIS, C. RUSHIN, J. HAY, and M. KLEIN 28 Sep. 1983 39 p
(Contract N00014-79-C-0168)
(AD-A140464; BUSM-83-14) Avail: NTIS HC A03/MF A01 CSDL 06N

Fifty-eight (58) relatively sedentary adults who were recruited into a physical fitness program involving 10 weeks of closely supervised, standardized and monitored exercises, were evaluated, physically, hematologically, and biochemically before and after participation in the program. Most of the participants were subjected to 16 different laboratory tests both before and after participation; a smaller group was subjected to as many as 20 tests. Physical responses to the conditioning program included a loss of body fat averaging 5%, a 3% of total body weight, a 32% excess body weight loss, decreased pulse rates at peak exertion of 5% and following the recovery period of 11%, an increased aerobic capacity (VO_2 max) of 8%, and an increased rate of sit-up performance of 28%. Statistically significant changes in laboratory data included drops in total hemoglobin and MCHC, increased red cell P50 and LDH, decreased serum cholesterol and triglycerides, increased serum HDL-cholesterol, and decreased plasma phosphorus. GRA

N84-26279# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

AEROMEDICAL SUPPORT IN MILITARY HELICOPTER OPERATIONS

Apr. 1984 99 p refs Lecture series held in Soesterberg, Netherlands, 4-5 Jun., Fuerstenfeldbruck, West Germany, 7-8 Jun., and Oslo, 12-13 Jun. 1984
(AGARD-LS-134; ISBN-92-835-1468-8) Avail: NTIS HC A05/MF A01

The medical aspects of military helicopter operations are discussed. Emphasis is placed on pilot performance and the physiological and psychological stresses that effect flight operations. Visual and acoustic perception is discussed with methods of protection against hazardous environments included.

Specifics such as flight crew back injuries, emergency medical evacuation, and crash injury analysis are also investigated.

N84-26280# Army Aeromedical Research Lab., Fort Rucker, Ala.

AEROMEDICAL SUPPORT IN MILITARY HELICOPTER OPERATIONS

D. R. PRICE /in AGARD Aeromed. Support in Mil. Helicopter Operations 2p Apr. 1984
Avail: NTIS HC A05/MF A01

A comprehensive update for the flight medical officer and other personnel providing aeromedical support for military helicopter operations is given. Areas that are addressed include: stressful missions such as nap-of-the-earth flying, night operations, and operations under other unfavorable circumstances; extended operations, aircrew fatigue, and its monitoring and prevention: visual protection and enhancement; perceptual illusions, their generation and disorienting effects in helicopter flight; acoustical hazards, auditory injury, hearing protection, and communications noise reduction; applied countermeasures for environmental extremes and the chemical warfare environment; helicopter accident and crash injury analysis; epidemiology, etiology, and prevention of back pain in helicopter pilots; and helicopter medical evacuation and rescue operations including evacuation of combat casualties. M.A.C.

N84-26281# British Army, Detmold (West Germany). Medical Centre.

STRESSFUL MISSION PROFILES, PART 1

S. J. DURNFORD /in AGARD Aeromed. Support in Mil. Helicopter Operations 8p Apr. 1984 refs
Avail: NTIS HC A05/MF A01

The stressors in those types of flights that are considered particularly stressful - NOE Nap Of the Earth flying, night flying with and without aids, mountain flying, flight over water, flight in Nuclear, Biological, and Chemical NBC clothing, instructional flying peacetime and flight in adverse weather conditions are described and analyzed. The stressors invoked by these flight profiles are set against the stressors found in all helicopter flying. M.A.C.

N84-26285# German Air Force, Fuerstenfeldbruck (West Germany). Inst. of Aerospace Medicine.

HEARING LOSS ASSOCIATED WITH HELICOPTER FLIGHT

W. NEYE /in AGARD Aeromed. Support in Mil. Helicopter Operations 9p Apr. 1984 refs
Avail: NTIS HC A05/MF A01

The occurrence and the influence of hearing damages caused by aircraft noise is investigated. In the audiometry tests conducted in the course of examinations for qualification, marked hearing losses in the high frequencies, especially in Army helicopter pilots are occasionally found. Through a comparative examination an attempt is made to determine whether higher hearing losses can be observed in helicopter pilots of the Army as compared to pilots of the other Services. Helicopter specific noise characteristics that cause significant hearing losses in pilots, which are more pronounced in Army pilots as compared to pilots of other aircraft types are examined. M.A.C.

N84-26288# Army Safety Center, Fort Rucker, Ala.

BACK PAIN IN HELICOPTER FLIGHT OPERATIONS

D. F. SHANAHAN /in AGARD Aeromed. Support in Mil. Helicopter Operations 9p Apr. 1984 refs
Avail: NTIS HC A05/MF A01

One of the major medical problems associated with military helicopter flight operations is the high prevalence of back pain reported by flightcrews. Epidemiological surveys indicate that up to 75 percent of helicopter flightcrews complain of this affliction and that it is having a significant effect on manpower availability. The two most widely implicated etiological factors in this problem are poor posture dictated by control and seat configurations in most operational helicopters and the chronic vibration to which helicopter flightcrews are subjected. The epidemiology and etiology

of back pain in helicopter aircrews are examined and potential means for treatment and prevention discussed. M.A.C.

N84-26290# Drexel Univ., Philadelphia, Pa.
A MATHEMATICAL MODEL OF THE CARDIOVASCULAR SYSTEM UNDER +GZ STRESS Ph.D. Thesis
 C. L. CHU 1984 154 p
 Avail: Univ. Microfilms Order No. DA8404708

A digital computer model of the human cardiovascular system has been developed. The model can be used for studying the cardiovascular system under conditions of +Gz stress. It can be used to investigate the effects of anti-G protection devices. The model includes simulation of the arterial and venous systems and the heart. It includes baroreceptor control of heart rate and venous tone, and allows the input of acceleration force and externally applied pressure to the system. The model has been used to study the impairment of cerebral function during Gz stress. Model predictions suggest that, for unprotected subjects, carotid pressure at eye level decreases to 50 mmHg (beginning of peripheral loss) at approximately 2.7 Gz. The pressure decreases to 20 mmHg (beginning of central light loss) at approximately 3.6 Gz. An anti-G suit provides an extra 1.1 to 1.5 Gz protection. Even though blood pressure supplying retinal vessels drops significantly at the above G levels, cerebral blood flow is maintained due to compensation mechanisms. Dissert. Abstr.

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

A84-33198
PSYCHOLOGY OF STRESS [PSIKHOLOGIIA STRESSA]
 L. A. KITAEV-SMYK Moscow, Izdatel'stvo Nauka, 1983, 368 p.
 In Russian. refs

A study of Selye's conception of stress as the 'common adaptation syndrome' describes a particular form of factors inducing stress reactions in which the primary element is reflexive-emotional stress. An analysis of the structures of these forms of behavior is presented for four categories of stress manifestations: the emotional-behavioral, vegetative, cognitive, and sociopsychological subsyndromes of stress. Mechanisms of emotional-behavioral stress manifestations are reviewed, and particular studies of this subsyndrome in short-term gravity-inertial and acoustical extreme conditions which may induce an 'innate' sense of fear are considered. The complexity of the interaction of vegetative and psychic functions is demonstrated for the example of motion sickness, and methods for arresting such reactions are developed. The influence of gravity-inertial stress on visual perception, spatial orientation, memory, and cognitive processes is examined. Small group dynamics and personal interaction in stress are also discussed, and the genetic foundations of individual reactions to stress are analyzed. J.N.

A84-33466
MEASURES OF HUMAN PROBLEM SOLVING PERFORMANCE IN FAULT DIAGNOSIS TASKS
 R. L. HENNEMAN and W. B. ROUSE (Georgia Institute of Technology, Atlanta, GA) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-14, Jan.-Feb. 1984, p. 99-112. refs
 (Contract MDA903-79-C-0421)

The literature relating to human performance in fault diagnosis tasks is reviewed with emphasis on measures of performance. Based on this review, 30 measures of ability, aptitude, cognitive style, and task performance are proposed for evaluation using data from two experiments that involved diagnosing faults in both simulated and live equipment. Results based on correlation,

regression, and factor analysis are presented that indicate only three unique dimensions of performance: errors, inefficiency, and time. In addition, cognitive style appears to be a reasonable predictor of performance. Ability, measured by standard precollege tests, is also a reasonable predictor when combined with measures of cognitive style. Author

A84-33719
PSYCHOLOGY OF RESPONSIBILITY [PSIKHOLOGIIA OTVESTSTVENNOSTI]
 K. MUZDYBAEV Leningrad, Izdatel'stvo Nauka, 1983, 240 p. In Russian. refs

Responsibility is conceptualized as a general personality trait, and the cognitive and social activity of the individual, his emotional reactions, and life failures and successes are analyzed with respect to the degree of development of this quality. Responsibility is then studied as a completely dependent variable from two viewpoints: factors determining the assumption of responsibility for a given life event, and actual responsible behavior in various situations. Situational factors which inhibit or encourage responsibility are examined. Attention is also given to forms of organization of labor, the stimulation of responsibility, and its delegation. J.N.

A84-34593
CRITERIA FOR EVALUATING PERSONALITY TRAITS IN DETERMINING THE PROFESSIONAL SUITABILITY OF FLIGHT SCHOOL CANDIDATES [KRITERII OTSENKI SVOISTV LICHNOSTI PRI OPREDELENIИ PROFESSIONAL'NOI PRIGODNOSTI KANDIDATOV V LETNYE UCHILISHCHA]
 A. L. GAVRILICHEV and N. F. LUKIANOVA Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), March 1984, p. 53, 54. In Russian. refs

A84-35900* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PERCEIVED THREAT AND AVOIDANCE MANEUVERS IN RESPONSE TO COCKPIT TRAFFIC DISPLAYS
 J. D. SMITH, S. R. ELLIS (NASA, Ames Research Center, Moffett Field, CA), and E. C. LEE (Informatics General, Inc., Palo Alto, CA) Human Factors (ISSN 0018-7208), vol. 26, Feb. 1984, p. 33-48. refs

Airline pilots rated their perception of the danger of an air-to-air collision based on cockpit displays of traffic information while they monitored simulated departures. They selected avoidance maneuvers when necessary for separation. Most evasive maneuvers were turns rather than vertical maneuvers. Evasive maneuvers chosen for encounters with lower moderate-collision danger were generally toward the intruding aircraft. This tendency lessened as the perceived threat level increased. In the highest threat situations, pilots turned toward the intruder only at chance levels. Intruders coming from positions in front of the pilot's ship were more frequently avoided by turns toward than when intruders approached laterally or from behind. Some of the implications of the pilot's turning-toward tendencies are discussed with respect to automatic collision avoidance systems and coordination of avoidance maneuvers of conflicting aircraft. Author

N84-25257# Joint Publications Research Service, Arlington, Va.
SOME PSYCHOLOGICAL CONSEQUENCES OF PROLONGED SOCIAL ISOLATION
 J. TERELAK In its USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p 74-77
 16 May 1984 Refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p 54-56
 Avail: NTIS HC A08

The environmental conditions of a stay in Antarctica are of great interest from the standpoint of cosmonautics and problems of effects on man's performance of long term isolation related to spaceflight conditions. In an analysis of the process of socioemotional adaptation of a small group that spent the winter in Antarctica, attention was called to a psychophysiological price of

the reaction related to this process. The behavioral disturbances demonstrated which are due to prolonged stays in polar regions, form the winterers' syndrome. The most frequently observed manifestations of the winterers' syndrome are depression, hostility, irritability, sleep disorders, loss of interest in work, diminished intellectual capabilities and disappearance of interests. In analysis of these symptoms, Mullin indicates the following possible causes of onset: need for long term stay in an isolated group; sameness of environment (monotony, boredom); absence of customary sources of emotional cues. The same features also was noted in laboratory studies simulating spaceflight conditions. Author

N84-25286# Navy Personnel Research and Development Center, San Diego, Calif.

COMPUTER-MANAGED INSTRUCTION: INDIVIDUAL DIFFERENCES IN STUDENT PERFORMANCE Interim Report, Oct. 1982 - Sep. 1983

P. A. FEDERICO Feb. 1984 22 p

(Contract F63-522)

(AD-A139708; NPRDC-TR-84-30) Avail: NTIS HC A02/MF A01 CSCI 051

To determine whether individual differences in student achievement and learning rate are reduced or eliminated by mastery instruction, 166 Navy trainees who had completed a computer-managed course in basic electricity and electronics were cluster-analyzed into groups, using 24 measures of cognitive characteristics. Discriminant analyses were computed between the two derived groups using module test scores and completion times. Groups differed significantly in their achievement in 4 out of 11 modules and in the time required to complete 1 module, but did not demonstrate a progressive decrease in the variability of their achievement and learning rates. Author (GRA)

N84-25287# New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Education.

UNDERSTANDING PICTURE-TEXT INSTRUCTIONS Final Report, 1 Mar. 1980 - 31 Mar. 1984

M. D. GLOCK, G. R. BIEGER, T. CRANDELL, M. KNOWLTON, and F. SCHORR 31 Mar. 1984 27 p Prepared in cooperation with Cornell Univ., Ithaca, N.Y., and Bucknell Univ., Lewisburg, Pa.

(Contract N00014-80-C-0372; RR0-4206)

(AD-A139746; TR-12-SER-B) Avail: NTIS HC A03/MF A01 CSCI 05J

This project investigated a variety of aspects of how procedural instructions comprised of text and pictures are comprehended and executed. The research focused on differences in comprehension and performance attributable to variations in the organization of the information, the format of the information, the metacognitive strategies employed by readers, and the interaction of readers with materials. The various studies confirmed that differences in comprehension and performance are related to these factors. Several categories of information were found to be very important if not essential for execution of procedural instructions, and it was further found that certain metacognitive strategies affected the speed and accuracy of performance. Additional investigations revealed that subjects rely on specific features of objects for purposes of identification and use those features to infer functional properties of the objects depicted. These findings are discussed in terms of a recursive model of the cognitive processing of picture-text information and implications for the design of instructional materials are discussed. Author (GRA)

N84-25288# Decisions and Designs, Inc., McLean, Va.

PSYCHOLOGICAL RESEARCH ON ADVANCED TERRAIN REPRESENTATION: FORMATTING THE VISUAL MATERIAL

R. N. KRAFT, J. F. PATTERSON, and N. B. MITCHELL Mar. 1984 111 p

(Contract MDA903-81-C-0568; DA PROJ. 2Q1-62717-A-790)

(AD-A139782; DDI/PR-82-9-331; ARI-RN-84-68) Avail: NTIS HC A06/MF A01 CSCI 051

This report describes an empirical investigation which was done to guide the development of a videodisc based system that will

provide free travel from a ground-level perspective within a simulated environment. The Advanced Terrain Representation (ATR) system will be based on a generalization of surrogate travel. The purpose of conducting this psychological research was to provide the bounds of perceptual acceptability for guiding subsequent technological development. Ideally, ATR would present a complete and veridical representation of the natural tactical environment; however, because of storage constraints inherent in videodisc technology, the amount of information which can be presented is limited. Psychological research was conducted to help produce a compelling, pedagogically effective system within these constraints. The primary research question was as follows: what is the most efficient way to represent a large piece of terrain in a perceptually informative fashion? A short summary of the findings indicate that the camera lens angle at which a picture is taken drives the estimation of distances from the observer to a point in the picture, but not the distance between two points in a photograph; the acceptable jump size is a function of the type of terrain; and the number of acceptable viewing and travel directions are narrowly constrained. GRA

N84-25289# Bernard Baruch Coll., New York.

BRAIN RESPONSES AND INFORMATION PROCESSING IV. INVESTIGATIONS OF HEMISPHERIC ASYMMETRY IN EVENT RELATED POTENTIALS AND PERFORMANCE DURING DISCRIMINATION OF LINE ORIENTATION, COLOR, SHAPE AND UNDER VISUAL MASKING Final Annual Report, 1 Oct. 1979 - 30 Sep. 1983

J. L. ANDREASSI and N. M. JUSZCZAK 30 Nov. 1983 84 p

(Contract F49620-80-C-0013; AF PROJ. 2313)

(AD-A139797; AFOSR-84-0182TR; FAR-4) Avail: NTIS HC A05/MF A01 CSCI 05J

The research completed over the last twelve months has included a number of studies concerned with evoked cortical potential correlates of visual stimulus processing in humans. The first experiment was conducted in order to replicate an earlier finding in which the amplitude of a relatively late positive component of the event related potential (ERP), known as the P3, was larger to a line orientation that required a yes response than one that required a no. The angular difference between the two lines was only 5 degrees. Another purpose was to assess the reliability of the better right hemisphere performance found with male subjects in the line orientation discrimination task used. In a second experiment, we examined the possibility of hemispheric asymmetry in response to two different colors (red and blue). The two hemispheres responded in essentially the same manner to the two colors. However, an interesting finding was the larger ERPs of both left and right hemispheres to the color blue, especially with central visual field stimulation. A third experiment was directed at the determination of whether the right hemisphere would be more sensitive to visual masking than the left, especially with a metacontrast paradigm which is dependent on spatial factors to produce the masking effect. A fourth experiment was performed to determine the relative responsivity of the two hemispheres to verbal (letter) and spatial (geometric form) stimuli. GRA

N84-25290# Illinois Univ., Urbana. Urbana Computer-based Education Research Lab.

DIMENSIONALITY, SCORING, AND RELATED PROBLEMS IN ADAPTIVE TESTING Final Report

J. M. EDDINS, K. TATSUOKA, and M. TATSUOKA Jan. 1984 30 p

(Contract N00014-79-C-0752; NR PROJ. 154-445; RR04204)

(AD-A139849; CERL-FR-83-5-ONR) Avail: NTIS HC A03/MF A01 CSCI 05J

Major efforts of the project fall into four categories. The relationship between the dimensionality of a data set and its underlying cognitive processes was investigated. Two approaches for diagnosing erroneous rules of operation were developed; an error vector system for constructing error diagnostic programs for signed number arithmetic and fraction addition problems, and a series of logical statements for constructing diagnostic programs for fraction problems; to circumvent the problems encountered in

the construction of error diagnostic programs, two indices based on deterministic Guttman theory were formed and used to detect aberrant response patterns; and the necessity for dealing quantitatively with variations in errors and changing rules of operation led to the investigation of probabalistic models for error diagnosis based on item response theory. GRA

N84-25291# Navy Personnel Research and Development Center, San Diego, Calif.

COMPUTER-MANAGED INSTRUCTION: STABILITY OF COGNITIVE COMPONENTS Interim Report, Oct. 1982 - Sep. 1983

P. A. FEDERICO Feb. 1984 31 p

(Contract DA PROJ. F63-522)

(AD-A139881; NPRDC-TR-84-29) Avail: NTIS HC A03/MF A01 CSCL 051

To ascertain changes in cognitive correlates of learning as students advance through hierarchical instruction, 24 individual difference measures were obtained from 166 Navy trainees who had completed a computer-managed course in electricity and electronics. Principal component analysis and varimax rotation were computed for cognitive characteristics, producing factor scores that were used in multiple regression analyses to predict achievement in 11 modules of instruction. During acquisition of course content, cognitive components sampled shifted noticeably in importance throughout the curriculum. The results have implications for aptitude-treatment-interaction (ATI) research, transition from novice to expert, crystallized and fluid intelligence, task demands of instruction, and computer-managed mastery learning.

Author (GRA)

N84-25292# Naval Training Analysis and Evaluation Group, Orlando, Fla.

THE DESIGN AND PRODUCTION OF A PROCEDURE TRAINING AID USING THE PROCEDURE LEARNING FORMAT AND THE COMPUTER AUTOMATED PAGE LAYOUT (PLA) ROUTINE

W. R. TERRELL, R. C. EWELL, P. SCOTT, and R. BRABY Dec. 1983 78 p

(AD-A139988; TAEG-TN-12-83) Avail: NTIS HC A05/MF A01 CSCL 051

The rapid introduction of increasingly complex military equipment has resulted in a major requirement for the timely development of more effective materials to train personnel in the performance of operation and maintenance procedures. The Training Analysis and Evaluation Group (TAEG) of the Naval Training Equipment Center has developed a learning format which increases the efficiency with which procedures are taught. This format relies heavily on graphics and uses words where necessary to clarify the meaning of the graphics. While documents based on the format are highly successful as procedure training aids and job performance aids these documents are expensive and time consuming to design and produce. The TAEG has responded to this problem by developing the computer automated page layout system, which significantly reduces the time and effort required to produce text graphic materials. The computer automated page layout (PLA) for text-graphic materials user's guide provides the subject matter expert an independent means to learn to use these computer routines to design and produce training aids. This report describes the field application of the PLA to the development of a procedure training aid for the SH-3D/H Helicopter. The demonstration is part of the TAEG development effort to provide tools for the design and publication of training aids. GRA

N84-25293# Stanford Univ., Calif. Dept. of Computer Science.

GUIDON: A COMPUTER-AIDED INSTRUCTIONAL PROGRAM

W. J. CLANCEY Nov. 1983 16 p

(Contract N00014-79-C-0302)

(AD-A139999; SU-SU-STAN-CS-83-997; SU-TR-9) Avail: NTIS HC A02/MF A01 CSCL 051

An intelligent computer-aided instruction (ICAI) program for teaching diagnosis is described. The program, called GUIDON, can discuss with a student any diagnostic problem (e.g., medical diagnosis) that it can solve on its own. By substituting problem

solving knowledge from other domains, the program can immediately discuss problems in those domains. This capability derives from the use of artificial intelligence methods for representing both subject material and knowledge of how to teach. The advantages of separate, explicit representations of both teaching knowledge and subject material are discussed. R.S.F.

N84-25294# Naval Biodynamics Lab., New Orleans, La.

MASSED PRACTICE: DOES IT CHANGE THE STATISTICAL PROPERTIES OF PERFORMANCE TESTS? Research Report

M. KRAUSE and J. C. WOLDSTAD Jun. 1983 33 p

(Contract F58524; M0933)

(AD-A139338; NBDL-83R005) Avail: NTIS HC A03/MF A01 CSCL 05J

Repeated trials on a task are frequently required for assessing training procedures or experimental treatments. Limited time, money, or availability of research subjects often result in the need to give a substantial number of trials on a task within a short period of time. However, in many laboratories repeated measures are traditionally separated by 24 hours or more to reduce the chances of fatigue, interference, or other factors introducing undesirable error variance. Massing practice is an obvious alternative to distributing it, particularly when time constraints exist. However, massed practice is only a desirable alternative if the resulting test scores maintain the statistical properties required for repeated measures analysis. Paper-and-pencil and computerized versions of traditional human performance tests were examined under massed practice conditions. Many of the tests had been shown to have high reliabilities and to meet the statistical requirements for repeated measures applications under distributed practice conditions in earlier studies at our laboratory. It is recommended that distributed practice with trials separated by 24 hours or more be used whenever feasible. If massed practice is required tasks should be chosen which have been shown to have high reliability and which meet the statistical requirements for repeated measures experimentation. It is expected that once computer tasks are refined they too will lend themselves to massed practice administration when required. GRA

N84-25295# Pomona Coll., Claremont, Calif.

VISUAL ORGANIZATION AND INFORMATION PROCESSING

W. P. BANKS Jun. 1983 10 p refs

(Contract MH-33279)

(PB84-170778; NIMH-84-382) Avail: NTIS HC A02/MF A01 CSCL 05J

The relation between visual organization and perception was analyzed and a theoretical account of this relation was developed. Target detection was shown to be improved if the experiment contained a memory component. Perceptual and memory-based discriminations among things show very different results, indicating that the memory comparisons do not use little replicas of physical objects. Author (GRA)

N84-26284# German Army, Bueckburg (West Germany). Aviation School.

DISORIENTATION IN HELICOPTER FLIGHT

F. FEHLER /in AGARD Aeromed. Support in Mil. Helicopter Operations 15p Apr. 1984 refs

Avail: NTIS HC A05/MF A01

The incapacity of the pilot to maintain a safe path of flight due to inadequate, erroneous or disregarded visual cues is investigated. The psychological process of visual perceptions is discussed especially with regard to the differences between optical stimuli from the surroundings and their subjective perception by the individual. Emphasis is placed on the fact that the human brain is an active organ and not just a mirror reflecting the visual stimuli from outside. To minimize disorientation the aviator should have in mind the basic programs according to which the brain processes visual stimuli, visual configurations which are prone to elicit visual illusions, and means to prevent the onset of disorientation.

M.A.C.

53 BEHAVIORAL SCIENCES

N84-26291*# Old Dominion Univ., Norfolk, Va. Dept. of Psychology.

OCULOMETRIC INDICES OF SIMULATOR AND AIRCRAFT MOTION Final Report

J. R. COMSTOCK Washington NASA Jun. 1984 135 p refs

(Contract NGT-47-003-800)

(NASA-CR-3801; NAS 1.26:3801) Avail: NTIS HC A07/MF A01 CSCL 05J

The effects on eye scan behavior of both simulator and aircraft motion and sensitivity of an oculometric measure to motion effects was demonstrated. It was found that fixation time is sensitive to motion effects. Differences between simulator motion and no motion conditions during a series of simulated ILS approaches were studied. The mean fixation time for the no motion condition was found to be significantly longer than for the motion conditions. Eye scan parameters based on data collected in flight, and in fixed base simulation were investigated. Motion effects were evident when the subject was viewing a display supplying attitude and flight path information. The nature of the information provided by motion was examined. The mean fixation times for the no motion condition were significantly longer than for either motion condition, while the two motion conditions did not differ. It is shown that motion serves an alerting function, providing a cue or clue to the pilot that something happened. It is suggested that simulation without motion cues may represent an understatement of the true capacity of the pilot. E.A.K.

N84-26292# National Aerospace Lab., Tokyo (Japan).

PERCEPTION OF THE MOVEMENT OF VISUAL SCENES DURING HORIZONTAL BODY ROTATION

N. ISU, J. KOO, and Y. OHKAWA Nov. 1983 16 p refs In JAPANESE; ENGLISH summary

(NAL-TR-787; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

As the first step in clarifying the factor of motion sickness the way movement of visual scenes was perceived during body rotation was examined under two conditions: when visual scenes were moving coincidentally with the body and when they were kept stationary. These visual scenes are those represented in our daily life by, respectively, the view from inside and that from outside a moving vehicle (e.g. aircraft). For this purpose three experiments were conducted and their results led to the following conclusions: (1) the scenes moving coincidentally with the body (inside view) are not always perceived coincident with it, and the apparent movement of visual scenes is perceived when the body is rotated sinusoidally at frequencies higher than 0.2 Hz; (2) stationary scenes (outside view) with peripheral vision are perceived as stationary, but without peripheral vision they are perceived as moving. Further, by modeling the perception system of the movement of visual scenes, the frequency characteristics of the human vestibulo-ocular system were obtained. B.W.

N84-26293# Army Research Inst. of Environmental Medicine, Natick, Mass.

A SOFTWARE PACKAGE FOR ADMINISTERING AND MONITORING THE ENVIRONMENTAL SYMPTOMS QUESTIONNAIRE (ESQ-3)

C. S. FULCO, A. CYMERMAN, and P. B. ROCK 28 Mar. 1984 19 p

(Contract DA PROJ. 3M1-61102-BS-10)

(AD-A140288; USARIEM-M20/84) Avail: NTIS HC A02/MF A01 CSCL 06S

The latest version of the Environmental Symptoms Questionnaire (ESQ-3) contains 67 symptoms designed to allow researchers to evaluate a broad range of environmental stresses. We have developed an interactive computer software package that administers and monitors the ESQ-3. This package, written in a format maximizing clarity, provides consistency of administration from one test or day to another, checks for response inconsistencies, maintains subject motivation, provides feedback to the subject and allows an investigator to quickly inspect raw and computed results. Further, because there is no interaction between investigators and subjects, no experimental bias can be

introduced. This package can be adapted to almost any computer system having a CRT and at least one disc drive. GRA

N84-26294# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

DEVELOPMENT OF A MODEL FOR HUMAN OPERATOR LEARNING IN CONTINUOUS ESTIMATION AND CONTROL TASKS Final Report, 15 Jul. - 30 Sep. 1983

W. H. LEVISON Wright-Patterson AFB, Ohio Air Force Medical Research Labs. Dec. 1983 108 p

(Contract F33615-81-C-0517; AF PROJ. 2312)

(AD-A140320; AFAMRL-TR-83-088) Avail: NTIS HC A06/MF A01 CSCL 05E

This research was directed toward the development of an analytic tool for the design of training procedures and the assessment of trainee performance in the kinds of monitoring, decision, and control tasks required for flight management. Manual control data obtained in previous AFAMRL Laboratory studies was analyzed with regard to learning behavior. This analysis consisted of three steps: model analysis with the optimal control pilot model (OCM) to determine the relations between stages of training and independent pilot-related model parameters; tests of some hypotheses concerning the underlying effects of training on control-strategy development; and preliminary analysis to explore relationships between the perceptual cueing environment and the pilot's internalized representation (internal model) of the task situation. The results of the analysis suggest that continued practice on the tracking task leads to a more precise, consistent, and linear (i.e., less noisy) type of response behavior, and to an improved internal model. Analytic results further suggest that, if the OCM is modified to account for the pilot's ability to construct his internal model, the model should be able to predict the effects of the task structure (including plant dynamics, input spectra, and cueing environment) on the rate at which (and degree to which) the human operator develops his estimation and control strategies. GRA

N84-26295# Hawaii Univ., Honolulu. Dept. of Psychology.

EFFECTS OF APPRAISAL SALIENCE ON IMMEDIATE AND MEMORY-BASED JUDGMENTS Interim Technical Report

J. L. BARNES-FARRELL and K. A. COUTURE (Purdue Univ.) Mar. 1984 32 p

(Contract N00014-83-K-0757)

(AD-A140334; TR-84-1) Avail: NTIS HC A03/MF A01 CSCL 05J

This study investigated the effects of appraisal task salience and retention interval upon the accuracy of performance ratings. Subjects viewed videotaped samples of employee performance and provided performance ratings of the behavior of the target individual depicted in the videotapes. Analyses of variance on followup t-tests indicated no main effects for appraisal salience or retention interval on overall accuracy of rating or elevation scores. A significant two-way interaction between appraisal salience or retention interval was observed for overall accuracy and elevation. Further investigation showed that subjects primed for the appraisal task were more accurate than subjects in the low appraisal salience condition, when ratings were made a week after observation of performance. The implications of the findings for performance appraisal and for the design of appraisal research are discussed. GRA

N84-26296# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Psychology.

EYE MOVEMENTS AND VISUAL INFORMATION PROCESSING Annual Progress Report, 1 Jan. - 31 Dec. 1983

E. KOWLER 23 Feb. 1984 12 p

(Contract AF-AFOSR-0085-82; AF PROJ. 2313)

(AD-A140438; AFOSR-84-0279TR) Avail: NTIS HC A02/MF A01 CSCL 05J

Eye movements determine the location and velocity of the retinal image. Thus, to understand how we see it is necessary to understand both how eye movements are controlled and how they effect visual information processing. The proposed research is

concerned with both problems. Specifically: the effect of expectations on smooth eye movements; and the eye moves smoothly in the direction of expected future target motion. Experiments will determine how expectations and guesses about the direction of future motion are formulated and the relative contributions of expectations and retinal image motion to smooth eye movements. The effect of saccades and saccade-like stimulus perturbations on visual information processing: Saccades continually displace the retinal image, yet we see the world as a single coherent picture. Experiments will find out whether the visual system selectively tolerates rapid lateral displacements, or whether the decision to move the eye is required. Programming sequences of saccades: Experiments will show whether sequences of saccades can be pre-programmed, and whether use of such sequences improves performance of visual tasks. GRA

N84-26297# Arizona State Univ., Tempe. Dept. of Psychology. **PHYSIOLOGICAL ASSESSMENT OF AIRCRAFT PILOT WORKLOAD IN SIMULATED LANDING AND SIMULATED HOSTILE THREAT ENVIRONMENTS Final Report** E. LINDHOLM, C. CHEATHAM, J. KORIATH, and T. M. LONGRIDGE Brooks AFB, Tex. AFHRL Apr. 1984 43 p (Contract F33615-80-C-0020; AF PROJ. 2313) (AD-A140469; AFHRL-TR-83-49) Avail: NTIS HC A03/MF A01 CSDL 06S

In two experiments, physiological metrics of cockpit workload were investigated in highly realistic flight simulators. In Experiment 1, non-pilot males were trained on a simulated landing task and a secondary, tone discrimination task while heart rate, skin conductance, and brain event-related potentials were continuously quantified. The results showed that heart rate was a more stable measure of workload than was skin conductance. Heart rate increased during each final approach to landing, and mean heart rate decreased as the subjects gained mastery over the task as a function of practice. Four ERP components (N1,P2,N2,P3) were statistically evaluated. As workload increased, N2 became more negative and P3 became less positive; also, as workload increased, the latency difference between P3 and N1 increased. Finally, a within-subject regression analysis was employed to express the extent to which the four ERP components were intercorrelated. This measure proved to have considerable power to predict how well individual subjects would perform on the landing tasks. In Experiment 2, rated male pilots flew a simulated mission involving threat by surface-to-air missiles (SAMs). Heart rate, respiration activity, and ERPs were quantified by means of a custom-designed, miniaturized recording system. The pilots were informed of the level of SAM threat by tones sounded in the headset. The results showed that heart rate and respiration activity increased as SAM threat increased. GRA

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

A84-33544

THE DOUBLE MAGNETIC INDUCTION METHOD FOR MEASURING EYE MOVEMENT - RESULTS IN MONKEY AND MAN

L. J. BOUR, J. A. M. VAN GISBERGEN, J. BRUIJNS, and F. P. OTTES (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-31, May 1984, p. 419-427. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek. refs

An improved version of the double magnetic induction method for measuring eye movement, proposed by Reulen and Bakker, is

described. The idea is to detect eye position indirectly by determining the strength of the induced secondary magnetic field of a short-circuited coil on the subject's eye caused by a primary magnetic field. A signal related to eye position is obtained from a detection coil, placed in front of the eye, without connecting wires. Instead of the short-circuited Collewyn-coil, a polished metal ring on the sclera of the eye is used. The method is more comfortable for the subject and results in a larger signal amplitude. The signal of the detection coil, consisting of a primary induced component and a relatively weak secondary component, is differentially amplified together with the signal of a compensation coil, consisting of only a primary component. The method has been used successfully in both man and monkey. Technical specifications of the method, as well as a procedure to correct for its inherent nonlinearity, are described. Author

A84-33607

FIGURE-GROUND SEGREGATION BY MOTION CONTRAST AND BY LUMINANCE CONTRAST

D. REGAN and K. I. BEVERLEY (Dalhousie University, Halifax, Canada) Optical Society of America, Journal, A: Optics and Image Science (ISSN 0740-3232), vol. 1, May 1984, p. 433-442. Sponsorship: Natural Sciences and Engineering Research Council of Canada. refs

(Contract NSERC-A-0323; AF-AFOSR-78-3711)

Some naturally camouflaged objects are invisible unless they move; their boundaries are then defined by motion contrast between object and background. The visual detection of such camouflaged objects was compared with the detection of objects whose boundaries were defined by luminance contrast. The summation field area is 0.16 sq deg, and the summation time constant is 750 msec for parafoveally viewed objects whose boundaries are defined by motion contrast; these values are, respectively, about 5 and 12 times larger than the corresponding values for objects defined by luminance contrast. The log detection threshold is proportional to the eccentricity for a camouflaged object of constant area. The effect of eccentricity on threshold is less for large objects than for small objects. The log summation field diameter for detecting camouflaged objects is roughly proportional to the eccentricity, increasing to about 20 deg at 32-deg eccentricity. In contrast to the 100:1 increase of summation area for detecting camouflaged objects, the temporal summation time constant changes by only 40 percent between eccentricities of 0 and 16 deg. Author

A84-33609

TEMPORAL COVARIANCE MODEL OF HUMAN MOTION PERCEPTION

J. P. H. VAN SANTEN and G. SPERLING (New York University, New York, NY) Optical Society of America, Journal, A: Optics and Image Science (ISSN 0740-3232), vol. 1, May 1984, p. 451-473. refs

(Contract AF-AFOSR-80-0279)

To provide a model of direction-sensitive units in human vision, the model developed in the context of experiments on insects by Reichardt (1957) was modified and elaborated. A basic motion-detecting unit is proposed which consists of two subunits, each of which performs a spatial and temporal linear filtering of its input. Outputs of the filters are multiplied, the multiplied output is integrated, and the model's output consists of the difference between the subunit outputs. The model is applied to threshold experiments in which subjects view adjacent vertical bars with independently temporally modulated luminances and must then report the lateral direction of the patterns. Various experiments confirmed fundamental properties of the model. It was demonstrated that motion detection involves sine-wave analysis in the temporal domain, and does not involve the frame-to-frame comparison processes hypothesized by other models. Performance with complex patterns may be predicted by spatiotemporal Fourier analysis resulting in the segregation and linear addition in the output for different temporal frequencies. J.N.

A84-33678

FAST-FOURIER-TURN METHOD FOR CALCULATION OF SAR DISTRIBUTIONS IN FINELY DISCRETIZED INHOMOGENEOUS MODELS OF BIOLOGICAL BODIES

D. T. BORUP and O. P. GANDHI (Utah, University, Salt Lake City, UT) IEEE Transactions on Microwave Theory and Techniques (ISSN 0018-9480), vol. MTT-32, April 1984, p. 355-360. refs (Contract NIH-ES-02304)

The paper describes a novel iterative approach for calculations of specific absorption rate (SAR) distributions in arbitrary, lossy, dielectric bodies. To date, the method has been used for 2-D problems where its accuracy has been confirmed by comparison with the analytic solutions for homogeneous and layered, circular, cylindrical bodies. With computation times that are proportional to $N \log(\text{base } 2)N$ rather than N squared to N cubed for the method of moments, the present approach should be extendable to 3-d bodies with $N = 10,000$ to $100,000$ cells allowing, thereby, details of SAR distributions that are needed for EM hyperthermia, as well as for assessing biological effects. Author

A84-34009#

HUMAN SYSTEMS INTERFACES FOR SPACE STATIONS

B. J. BLUTH (California State University, Northridge, CA) IN: Space Systems Technology Conference, Costa Mesa, CA, June 5-7, 1984, Technical Papers. New York, American Institute of Aeronautics and Astronautics, 1984, p. 40-49. refs (AIAA PAPER 84-1115)

The Space Station is to be primarily an operational vehicle which has to tend successfully to customer demands. The special position of the Space Station with respect to other spacecraft and the Space Shuttle lead to an important modification in the place and importance of the role of Human Systems in the design, development, and operation of a Space Station. Human productivity is now a far more significant factor than it has been before. Aspects of human productivity are considered along with the context of human productivity, the effects of weightlessness on the physiological status of the human body, food as an important biochemical variable and a psychological and social factor, human systems interfaces, preliminary results, and the implementation of human productivity. G.R.

A84-34017*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

AUTOMATION IN TELEOPERATION FROM A MAN-MACHINE INTERFACE VIEWPOINT

A. K. BEJCZY and K. CORKER (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN: Space Systems Technology Conference, Costa Mesa, CA, June 5-7, 1984, Technical Papers. New York, American Institute of Aeronautics and Astronautics, 1984, p. 108-113. NASA-supported research. refs

(AIAA PAPER 84-1116)

Teleoperation can be defined as the use of robotic devices having mobility, manipulative and some sensing capabilities, and remotely controlled by a human operator. The purpose of this paper is to discuss and exemplify technology issues related to the use of robots as man-extension or teleoperator systems in space. The main thrust of the paper is focused at research and development in the area of sensing- and computer-based automation from the viewpoint of man-machine interface devices and techniques. The objective of this R and D effort is to render space teleoperation efficient and safe through the use of devices and techniques which will permit integrated and task-level ('intelligent') two-way control communication between human operator and teleoperator machine in earth orbit. Author

A84-34393

DISTRIBUTION OF ABSORBED POWER INSIDE A SPHERE SIMULATING THE HUMAN HEAD IN THE NEAR FIELD OF A LAMBDA/2 DIPOLE ANTENNA

Y. AMEMIYA and S. UEBAYASHI (Nagoya University, Nagoya, Japan) Electronics and Communications in Japan (ISSN 0424-8368), vol. 66, Sept. 1983, p. 64-72. Translation. refs

Attention is called to the exception made for low power devices (such as portable radio transmitters) by the American National Standards Institute (ANSI C95). This exception was made because it was thought that these devices generate fields that, although exceeding the protection guide locally, result in a significantly lower rate of energy absorption for the body as a whole. It is contended here, however, that the localized fields have a serious effect, at least on the eyes where heat convection due to blood flow is very small. The distribution of the absorbed power in a model of a human head exposed in the immediate vicinity of a portable transmitter is given here. The head is simulated by a homogeneous lossy sphere, and a lambda/2 dipole antenna is used as the portable transmitter. It is found that the local absorbed power is extremely large at the surface of the sphere closest to the antenna, although the average value is sufficiently small. C.R.

N84-25253# Joint Publications Research Service, Arlington, Va. SANITARY AND HYGIENIC FEATURES OF CABIN ENVIRONMENT IN SALYUT-7 ORBITAL STATION

S. N. ZALOGUYEV, V. P. SAVINA, L. N. MAKHAMEDIYEVA, Y. G. NEFEDOV, A. N. VIKTOROV, M. A. VYTCHIKOVA, and T. V. BATENCHUK-TUSKO In its USSR Rept.: Space Biol. and Aerospace Med., v. 18, no. 2, Mar. - Apr. 1984 (JPRS-USB-84-004) p. 52-56 16 May 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 2, Mar. - Apr. 1984 p. 40-43

Avail: NTIS HC A08

The Salyut-7 cabin environment was investigated with respect to the chemical, biological and physical factors. The gas composition was measured qualitatively and quantitatively. This determination showed a higher content of acetone and acetaldehyde when the cosmonauts worked on various trainers and unloaded the Progress cargo vehicles. The time-course study of the toxic impurities indicated that the increase in their content was transient (no more than 4 h). The microbial content was lower than in the Salyut-6 cabin environment. No correlation between the microbial content in the environment and the time the prime crew remained onboard was shown. There was a correlation between the microbial content, temperature variations, and conduct of certain experiments. On the whole, the Salyut-7 cabin environment was normal for the life and work of the crewmembers. Author

N84-25296# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.

A MULTIVARIATE AUTOREGRESSIVE DISPLAY MONITORING MODEL

P. MILGRAM 6 Oct. 1983 24 p refs Presented at 3rd European Ann. Conf. on Human Decision Making and Manual Control, Roskilde, Denmark, 30 May - 1 Jun. 1983 (NLR-MP-83033-U) Avail: NTIS HC A02/MF A01

Multivariate autoregressive (AR) time series models were used for the normative modelling of the visual monitoring behavior and anomaly detection performance of a human operator (HO) observing a correlated multi-instrument display system. The relationship between the AR representation and both older nonparametric scanning models and more recent state space cum Kalman filter formulations is discussed. Concerning the latter relationship, there are benefits with the AR model principally with respect to identification of the underlying physical system and to the problem (primarily computational) of attributing to HO a low order internal model of a (in reality) high order system. Both average and dynamic monitoring behavior were modellable, the former in terms of spectral relationships and relative uncertainty (redundancy) and the latter in terms of predictions of probability of limit exceedence and likelihood of the occurrence of deterministic

anomalies. The optimal predictive capabilities of the model are discussed. A computationally efficient recursive algorithm was developed for computing a matrix function of estimation error covariances (i.e., uncertainty), dependent only upon statistical model identification and recent scanning history. Author

N84-25297# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5

HUMAN FACTORS IN WEAPON SYSTEMS

B. BERGSTROEM, ed. and J. PALM, ed. Feb. 1984 95 p refs In SWEDISH and ENGLISH Proc. of Symp., Stockholm, 13 Apr. 1983; Sponsored by Research Inst. of National Defence (FOA) 56 (FOA-A-56006-H2; ISSN-0281-0239) Avail: NTIS HC A05/MF A01

A conference on Human Factors in Weapon Systems, held 1983-04-13 in Stockholm is reported. The symposium was arranged by the Human Factors Division of National Defence Research Institute. Topics discussed include: human factors engineering and product development; human factors in weapon systems; and flight plans. E.A.K.

N84-25298# Trinity Coll., Dublin (Ireland). Dept. of Psychology. **PROLONGED HEAVY VEHICLE DRIVING PERFORMANCE: EFFECTS OF UNPREDICTABLE SHIFT ONSET AND DURATION AND CONVOY VERSUS INDEPENDENT DRIVING CONDITIONS Final Technical Report**

R. G. C. FULLER Sep. 1983 126 p (Contract DA-ERO-78-G-006; DA PROJ. 2Q1-61102-B-74-F) (AD-A139747; ARI-TR-585) Avail: NTIS HC A07/MF A01 CSCL 05J

Truck driver safety was studied under conditions of prolonged normal driving, prolonged continuous convoy during under conditions of task uncertainty. In all experiments drivers were required to drive an experimental truck for four consecutive days. Dependent variables were driver performance, self ratings, and endocrine changes. Apart from changes over time, where possible the effects of age and time of work period onset were determined. Symptoms of fatigue were most typical of the end of the driving shift, becoming evident from about the 9th hour of driving, and were particularly characteristic of older drivers on a shift finishing at 02.30 hours. Nevertheless the requirement to drive 11 hours per day for 4 consecutive days did not lead to conspicuous deterioration in driving performance under normal driving conditions. Even under continuous convoy driving such prolonged work did not produce impairment but elicited compensatory adjustments toward the end of the late shift. Finally, task uncertainty was not found to induce earlier fatigue. Drivers appeared to adjust to this condition by covertly anticipating a demand in excess of actual requirement. A behavioral analysis of the driving task was proposed and among other features its implications for driver fatigue and traffic accidents were discussed. Author (GRA)

N84-25299# Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science Industrial Engineering/Operations Research.

HUMAN-COMPUTER INTERACTIONS AND DECISION BEHAVIOR Final Report

R. C. WILLIGES, R. W. EHRICH, B. H. WILLIGES, H. R. HARTSON, and J. S. GREENSTEIN Jan. 1984 65 p (Contract N00014-81-K-0143; DA PROJ. RR0-4209) (AD-A139759; CSIE-83-16) Avail: NTIS HC A04/MF A01 CSCL 05H

This is the final report of a three year research program directed toward understanding and improving human-computer dialogue. This report provides an overview of the research program, the scientific personnel who worked on the project, the major scientific accomplishments, the list of reports and archival publications, the technical information exchange, the interdisciplinary graduate training and the project impact for future research. Author (GRA)

N84-25300# Illinois Univ., Urbana. Coordinated Science Lab. **AN EXPERT DISTRIBUTED ROBOTICS SYSTEM WITH COMPREHENSION AND LEARNING ABILITIES IN THE AIRCRAFT FLIGHT DOMAIN Annual Technical Report, 1 Jan. - 31 Dec. 1983**

D. L. WALTZ and G. F. DEJONG Feb. 1984 43 p (Contract F49620-82-K-0009; AF PROJ. 2304) (AD-A139826; T-138; AFOSR-84-0185TR) Avail: NTIS HC A03/MF A01 CSCL 06D

Research has continued during the past year on critical components for a comprehensive expert system for on-board use in an aircraft. The investigators report on a system that can reason about the operation of a gas turbine engine; a system about route and trajectory meta-planning; a temporal reasoning system; a system for extracting speaker goals from natural language dialogue; systems for acquiring new knowledge schemas from natural language input; and systems for high level perceptual reasoning. GRA

N84-25301# Naval Postgraduate School, Monterey, Calif.

AN INTERNAL REVIEW AND OPERATIONAL TRIAL OF A HUMAN FACTORS ENGINEERING SELF-PACED COURSE IN ACCORDANCE WITH THE INSTRUCTIONAL SYSTEMS DEVELOPMENT PROCESS M.S. Thesis

M. M. FLEMING Dec. 1983 254 p (AD-A140011) Avail: NTIS HC A12/MF A01 CSCL 05E

The Government Accounting Office (GAO) has stated that insufficient attention is given to Human Factors Engineering (HFE) in the design of systems during the Weapons Acquisition Cycle (WAC). According to GAO these inadequacies have adversely impacted our military capabilities and wasted lives and millions of dollars. A myriad of handbooks, manuals and standards exist which provide detailed guidelines, criteria, and test plans for conducting HF T + E (Test and Evaluation) which remain because their technological level is beyond the average user. The need for basic training in HFE has been clearly identified. A cost effective vehicle to bridge this gap in conceptual knowledge has been developed in the form of an HFE Self-Paced Course. The conclusions provided in this study are intended to encourage further course development through incorporation of the recommendations outlined. Ultimately, this would lead to its validation and implementation into the instructional system of the military. GRA

N84-25302# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

FUEL FIRE TESTS OF THE HELICOPTER CREWMAN JACKET Final Report

G. H. KYDD and G. K. ASKEW 4 Feb. 1983 28 p (AD-A140037; NADC-83014-60) Avail: NTIS HC A03/MF A01 CSCL 06Q

The Helicopter Crewman Jacket is not only resistant to flames itself, but it adds to whatever other protection the crewman might have creating a generally safer micro-environment. GRA

N84-25303# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

FUEL FIRE TESTS OF POLYTETRA-FLUOROETHYLENE ANTI-EXPOSURE SUITS Final Report

G. H. KYDD and G. K. ASKEW 28 Feb. 1983 42 p (AD-A140038; NADC-83008-60) Avail: NTIS HC A03/MF A01 CSCL 06Q

Three anti-exposure suits fabricated of Nomex and PTFE when exposed to a fuel fire of JP-4 for seconds, did not burn, on self-extinguished returning a protective barrier to the potential wearer. GRA

N84-25304# General Electric Co., St. Petersburg, Fla. Metallurgy and Ceramics Lab.

HUMAN FACTORS: A NECESSARY TOOL FOR INDUSTRY

K. O. STARCHER Mar. 1984 12 p refs

(Contract DE-AC04-76DP-00656)

(DE84-007531; GEPP-TIS-786) Avail: NTIS HC A02/MF A01

The need for human factors (ergonomics) input in the layout of a ferroelectric ceramics laboratory is presented as an example of the overall need for human factors professionals in industry. However, even in the absence of one trained in human factors, knowledge of a few principles in ergonomics will provide many possibilities for improving performance in the industrial environment. DOE

N84-26282# British Army, Detmold (West Germany). Medical Centre.

STRESSFUL MISSION PROFILES, PART 2: WORKLOAD AND FATIGUE

S. J. DURNFORD In AGARD Aeromed. Support in Mil. Helicopter Operations 8p Apr. 1984 refs

Avail: NTIS HC A05/MF A01

The way that stressors combine with factors within the man (such as previous training) and the demands of the actual flying mission to produce an overall workload are investigated. The manner in which different levels of workload may affect performance are discussed and methods that might be used by flight surgeons to reduce aircrew workload levels are covered. The impact of future technology is briefly considered. M.A.C.

N84-26283# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

VISUAL PROBLEMS IN HELICOPTER OPERATIONS

D. H. BRENNAN In AGARD Aeromed. Support in Mil. Helicopter Operations 11p Apr. 1984 refs

Avail: NTIS HC A05/MF A01

The importance of ocular physiology, visual standards, transparency optics and cockpit lighting systems in ensuring an adequate level of performance is discussed. Ocular hazards from impact, nuclear flash, chemical warfare agents and lasers are discussed and related to the advantages and disadvantages of protective equipment. A review of some of the devices currently available for visual enhancement and the problems associated with their use is included. M.A.C.

N84-26286# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

THERMAL CONTROL PROBLEMS IN MILITARY HELICOPTERS

J. R. ALLAN In AGARD Aeromed. Support in Mil. Helicopter Operations 10p Apr. 1984 refs

Avail: NTIS HC A05/MF A01

The origins of thermal problems in military helicopters are discussed and compared with those of fixed wing aircraft. Some typical helicopter sortie temperature profiles are presented for hot and cold environments. The requirements for protection from chemical warfare agents are described in relation to helicopter operations and the additional thermal problems arising from chemical protective assemblies and drills are described. Potential adverse effects on aircrew performance and fatigue are considered. Thermal hazards in post crash survival situations are also considered particularly those related to ditching in cold water. Various approaches to the relief of thermal stress in helicopter aircrew are considered. The limitation of engine powered environmental control systems and the potential advantages of personal conditioning systems are described. The advantages of liquid conditioned systems are compared with air systems. Cold environment protection is described in terms of insulation and water exclusion and the role of electrically heated garments is described. M.A.C.

N84-26287# Army Safety Center, Fort Rucker, Ala.

MEDICAL ASPECTS OF HELICOPTER SAFETY AND CRASHWORTHINESS

D. F. SHANAHAN In AGARD Aeromed. Support in Mil. Helicopter Operations 13p Apr. 1984 refs

Avail: NTIS HC A05/MF A01

A review of the past five years' accident experience reveals that 80 percent are attributed to human error. The relationship of errors to system efficiencies is established through human factors analysis. Once identified, appropriate measures can be instituted to correct these deficiencies. Principles of helicopter crashworthiness are reviewed, and the means for deriving these principles from crash injury analysis is discussed. M.A.C.

N84-26298# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

THE VERRUN AND VERNAL SOFTWARE SYSTEMS FOR STEADY-STATE VISUAL EVOKED RESPONSE EXPERIMENTATION Final Report

W. H. LEVISON and G. L. ZACHARIAS Mar. 1984 222 p

(Contract NAS1-16982)

(NASA-CR-172311; L-5486; NAS 1.26:172311) Avail: NTIS HC A10/MF A01 CSCL 05H

Two digital computer programs were developed for use in experiments involving steady-state visual evoked response (VER): VERRUN, whose primary functions are to generate a sum-of-sines (SOS) stimulus and to digitize and store electro-cortical response; and VERNAL, which provides both time- and frequency-domain metrics of the evoked response. These programs were coded in FORTRAN for operation on the PDP-11/34, using the RSX-11 Operating System, and the PDP-11/23, using the RT-11 Operating System. Users' and programmers' guides to these programs are provided, and guidelines for model analysis of VER data are suggested. R.J.F.

N84-26299# European Space Agency, Paris (France).

INVESTIGATION OF INTERACTIONS BETWEEN HELMET-MOUNTED SIGHT/DISPLAY, SENSOR PLATFORM AND HUMAN PILOT

E. DANNEBERG, E. KOHNEN, H. STEIN, and U. STOLZKE Jun. 1983 220 p refs Transl. into ENGLISH of "Untersuchungen des Zusammenwirkens von Helmet-Mounted Sight/Display und Sensorschwenkrahmen unter Einschluss eines Piloten" rept. DVFLR-FB-81-30 DVFLR, Brunswick, Jun. 1981 181 p

(ESA-TT-746; DVFLR-FB-81-30) Avail: NTIS HC A10/MF A01; original German report available from DVFLR, Cologne DM 37,90

When helicopters are used at night and under conditions of poor visibility, technical aids must replace the pilot's lack of vision. The interaction of a Helmet Mounted Sight/Display (HMS/D), a moving sensor platform, and a human pilot as system user was investigated by means of laboratory, moving simulator, and flight tests. Particular emphasis was given to the technical potential of the HMS/D in the laboratory, the tracking accuracy which could be achieved by the pilot on the moving simulator, and the practical application under real, military flight conditions. R.S.F.

N84-26300# European Space Agency, Paris (France).

THE PROJECT COCKPIT INSTRUMENTS AND HUMAN ENGINEERING AS PART OF A JOINT RESEARCH PROGRAM ON AIRCRAFT GUIDANCE AND CONTROL AT THE TECHNICAL UNIVERSITY OF BRUNSWICK Final Report

R. BEYER Sep. 1983 83 p refs Transl. into ENGLISH of "Abschlussbericht des teilprojekts Bordinstrumentierung und Anthropotechnik in sonderforschungsbereich flugfuehrung der TU Braunschweig" rept. DVFLR-FB-82-13 DVFLR, Brunswick, Jan. 1982

(ESA-TT-783; DVFLR-FB-82-13) Avail: NTIS HC A05/MF A01; original German report available from DVFLR, Cologne DM 41,10

Human factors engineering relating to aircraft cockpit instrumentation is discussed. Display systems, control equipment, and the improvement of human factors engineering assessment methods and procedures were the focal points of the investigation.

Pilot stress and vision measurement are described in detail.

R.S.F.

N84-26301# Office National d'Etudes et de Recherches Aérospatiales, Paris (France).

FLIGHT DYNAMICS AND AIRCRAFT PILOTING

J. C. WANNER 1983 210 p refs In FRENCH; ENGLISH summary Report will also be announced as translation ESA-TT-874

(ONERA-P-1983-1; ISSN-0078-379X; ESA-TT-874) Avail: NTIS HC A10/MF A01

After a presentation of the principle of piloted vehicle mechanics, the study of the aircraft longitudinal movement is undertaken. Assuming that the pilot counters with his lateral controls any sideslip, and that the aircraft plane of symmetry is vertical, the trajectory, is described in that same vertical plane. The natural modes (angle of attack oscillation, phugoid, aperiodic motion) of the small movements around the straight and level flight, the response to the pilot's commands, and the equilibrium stability, are studied. Small lateral movements around straight and level flight and of the aircraft response to lateral controls are studied. The small movements of the aircraft around the stabilized level flight in rotation are also examined. The assumptions of separation of longitudinal and lateral movements around the stabilized straight and level flight are validated.

M.A.C.

N84-26302# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

HUMAN FACTORS ENGINEERING. PART 1: TEST PROCEDURES Final Report

J. C. PERKINS, D. C. R. BENEL, and L. W. AVERY 30 Nov. 1983 640 p Supersedes TOP-02-2-803, TOP-04-3-515, TOP-06-2-502, TOP-02-3-516, TOP-05-2-545, TOP-06-3-525, TOP-1-2-611, TOP-03-3-521, TOP-05-3-507, TOP-07-3-510, and TOP-1-2-610

(AD-A140343; TOP-1-2-610-PT-1; TOP-02-2-803; TOP-04-3-515; TOP-06-2-502; TOP-02-3-516; TOP-05-2-545; TOP-06-3-525; TOP-1-2-611; TOP-03-3-521; TOP-05-3-507; TOP-07-3-510; TOP-1-2-610) Avail: NTIS HC A99/MF A01 CSCL 05E

The material in this TOP (Test Operations Procedure) is intended to be used for the Human Factors Engineering (HFE) assessment of all types of material and systems tested by TECOM (Test and Evaluation Command). Supplementary sources of guidance are indicated when required. It encompasses the HFE procedures for the testing of design, functional performance and environmental considerations for the major test functions (operability, maintainability, transportability, portability/usability, and habitability) applicable to the HFE assessment. This TOP contains two parts: Part 1, Test Procedures and Part 2, HEDGE. Part 1, the Test Procedures, provides guidance on how to plan and conduct an HFE test. This part also includes specific test procedures and sample data collection forms, such as checklists, questionnaire/interview sheets and other data collection forms. Part 2, the Human Factors Engineering Data Guide for Evaluation (HEDGE) provides planning guidance concerning what to test and includes guidance in the selection of applicable test functions, test conditions, performance tasks, and detailed design criteria.

GRA

N84-26303# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

HUMAN FACTORS ENGINEERING. PART 2: HEDGE (HUMAN FACTORS ENGINEERING DATA GUIDE FOR EVALUATION)

30 Nov. 1983 397 p (AD-A140391; TOP-1-2-610-PT-2) Avail: NTIS HC A17/MF A01 CSCL 05E

The purpose of the information in HEDGE is to expand test capabilities in considering the human element. It will provide a strategy for viewing an item which is undergoing testing from the standpoint of the soldier who must ultimately operate, maintain, or otherwise utilize it. The use of these materials, in addition to standard Task and Design Checklists and Questionnaires, will tailor HFE subtest to a specific item. These materials are intended to

support test engineers not design engineers. They were designed with specific tasks in mind, i.e., preparing a Test Plan, conducting a test, analyzing and interpreting test data, and generating the test report. They were prepared under the cognizance of the TECOM Human Factors Engineering Directorate. GRA

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PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

A84-33188

THE SPECTROSCOPIC IDENTIFICATION OF INTERSTELLAR GRAINS

F. HOYLE, N. C. WICKRAMASINGHE, and S. AL-MUFTI (University College, Cardiff, Wales) Astrophysics and Space Science (ISSN 0004-640X), vol. 98, no. 2, Jan. 1984, p. 343-352. refs

It is shown that the condition of matching the 3.3-3.9-micron spectrum of the galactic infrared source GC-IRS 7 leads to a remarkably tight convergence on the transmittance curve measured in the laboratory for the desiccated bacterium *E. coli*. Other materials, including certain biochemicals and postulated prebiologic compounds, are shown to be deficient with regard to meeting this condition. Author

A84-33949

AN ATTEMPT TO ESTIMATE THE COSMOLOGICAL CONDITIONS OF LIFE ORIGIN [POPYTKA OTSENKI KOSMOLOGICHESKIKH USLOVII VOZNIKNOVENIIA ZHIZNI]

L. L. MOROZOV, V. V. KUZMIN, and V. I. GOLDANSKII (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 275, no. 1, 1984, p. 198-201. In Russian. refs

An attempt is made to estimate the specific physical conditions which produced the early biosphere on the basis of the time-of-expectation criterion proposed in an earlier study (Morozov et al., 1984). Minimum times of expectation for the formation of the early biosphere with symmetry breakdown are determined for a gaseous and a liquid medium. Estimates of the time of expectation, energy of particle interaction, and maximum particle size are shown to be in good agreement with the real characteristics of the earth's biosphere. V.L.

A84-34213

NO EVIDENCE FOR INTERSTELLAR PROTEINS

R. H. KOCH and R. E. DAVIES (Pennsylvania, University, Philadelphia, PA) Astrophysics and Space Science (ISSN 0004-640X), vol. 100, no. 1-2, March 1984, p. 425, 426. refs

The claim by Karim et al. (1983) that the broad interstellar feature near 280 nm suggests the existence of proteinaceous matter in the interstellar medium is addressed. From astronomical and biochemical arguments it is shown that no quantitative measures of optical depth can be derived from the published data and that there is a great wealth of organic molecules which have absorptions at or near this wavelength interval. The amino acid tryptophan is one such molecule but the deduced spectrum does not satisfy two other properties of its spectrum. In particular, the 280 nm absorption for tryptophan refers to an aqueous solution of the molecule, and no liquid water is expected to exist in the ISM. C.D.

A84-34215

ON THE 2800 A INTERSTELLAR EXTINCTION FEATURE

L. M. KARIM, F. HOYLE, and N. C. WICKRAMASINGHE (University College, Cardiff, Wales) Astrophysics and Space Science (ISSN 0004-640X), vol. 100, no. 1-2, March 1984, p. 431-435. refs

Two criticisms of a finding that an interstellar feature near 2800 A is due to proteinaceous material in the interstellar medium are answered. While the astronomical data cannot be taken to

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imply uniquely the presence of interstellar tryptophan, they do serve as a consistency check of the bacterial grain model. The additional absorptions shortward of 2400 Å which should be observed for tryptophan may be masked by over-whelmingly strong absorption due to graphite grains. In answer to the second criticism, it is argued that significant saturation effects could not have occurred in all of the sample spectra. Other IUE spectra published by other authors which imply a slight excess of extinction near 2800 Å are shown, and their similarity to the expected behavior of coliform bacteria is noted. C.D.

A84-35597* Houston Univ., Tex.

ON THE ABIOTIC FORMATION OF AMINO ACIDS. I - HCN AS A PRECURSOR OF AMINO ACIDS DETECTED IN EXTRACTS OF LUNAR SAMPLES. II - FORMATION OF HCN AND AMINO ACIDS FROM SIMULATED MIXTURES OF GASES RELEASED FROM LUNAR SAMPLES

S. YUASA, D. FLORY, B. BASILE, and J. ORO (Houston, University, Houston, TX) *Journal of Molecular Evolution* (ISSN 0022-2844), vol. 20, no. 1, 1984, p. 52-58. refs
(Contract NGR-44-005-002)

Two studies on the abiotic formation of amino acids are presented. The first study demonstrates the role of hydrogen cyanide as a precursor of amino acids detected in extracts of lunar samples. The formation of several amino acids, including glycine, alanine, aspartic acid, and glutamic acid, under conditions similar to those used for the analysis of lunar samples is demonstrated. The second study investigates the formation of hydrogen cyanide as well as amino acids from lunar-sample gas mixtures under electrical discharge conditions. These results extend the possibility of synthesis of amino acids to planetary bodies with primordial atmospheres less reducing than a mixture of methane, ammonia, hydrogen and water. Author

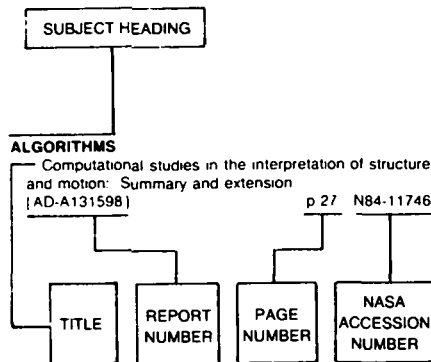
A84-35633

BIOASTRONOMY - THE SEARCH FOR EXTRATERRESTRIAL LIFE

M. D. PAPAGIANNIS (Boston University, Boston, MA) *Sky and Telescope* (ISSN 0037-6604), vol. 67, June 1984, p. 508-511.

The search for primitive life in other planetary systems may be conducted spectroscopically, although this is presently beyond the capabilities of telescopic technology. Such studies must, moreover, await the unambiguous identification of the planets themselves. The use of electronic devices for the measurement of stellar motions may make the search for Jupiter-size planets of the 100 nearest stars possible by the end of this decade. The strategy for seeking advanced technological civilizations is totally different, however, for it must be assumed that intelligent beings will welcome and even actively pursue such communication. O.C.

Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, the title extension is added, separated from the title by three hyphens. The (NASA or AIAA) accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.

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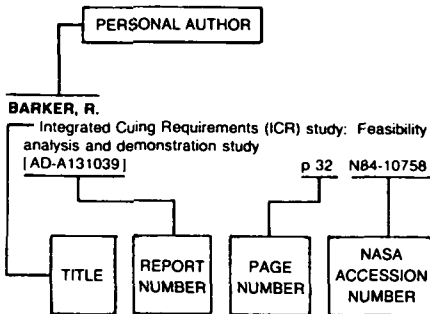
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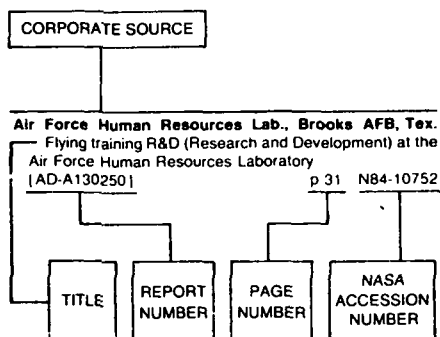
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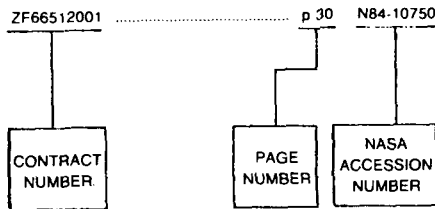
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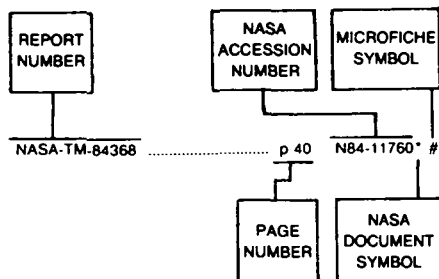
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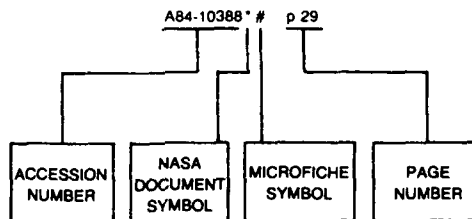
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